

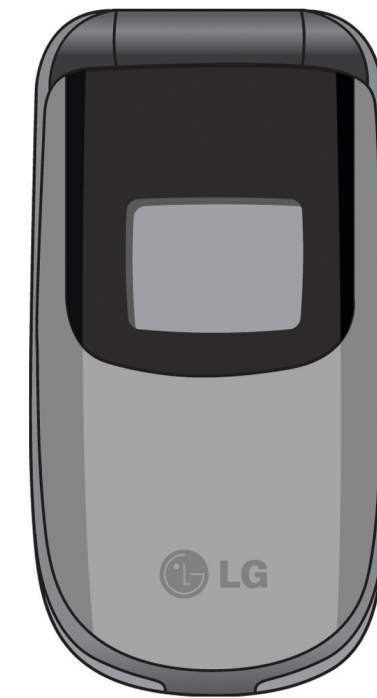


Service Manual



Service Manual

KG120



Model : KG120

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1. INTRODUCTION

1.1 Purpose

This manual provides the information necessary to repair, description and download the features of this model.

1.2 Regulatory Information

A. Security

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services. System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common-carrier telecommunication service of facilities accessed through or connected to it. The manufacturer will not be responsible for any charges that result from such unauthorized use.

B. Incidence of Harm

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

C. Changes in Service

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the this phone or compatibility with the network, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

D. Maintenance Limitations

Maintenance limitations on this model must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs expect as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

1. INTRODUCTION

E. Notice of Radiated Emissions

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

F. Pictures

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

G. Interference and Attenuation

Phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

H. Electrostatic Sensitive Devices

ATTENTION

Boards, which contain Electrostatic Sensitive Device (ESD), are indicated  by the sign. Following information is ESD handling:

- Service personnel should ground themselves by using a wrist strap when exchange system boards.
- When repairs are made to a system board, they should spread the floor with anti-static mat which is also grounded.
- Use a suitable, grounded soldering iron.
- Keep sensitive parts in these protective packages until these are used.
- When returning system boards or parts like EEPROM to the factory, use the protective package as described.

1. INTRODUCTION

1.3 Abbreviations

For the purposes of this manual, following abbreviations apply:

| | |
|--------|---|
| APC | Automatic Power Control |
| BB | Baseband |
| BER | Bit Error Ratio |
| CC-CV | Constant Current - Constant Voltage |
| DAC | Digital to Analog Converter |
| DCS | Digital Communication System |
| dBm | dB relative to 1 milli watt |
| DSP | Digital Signal Processing |
| EEPROM | Electrical Erasable Programmable Read-Only Memory |
| ESD | Electrostatic Discharge |
| FPCB | Flexible Printed Circuit Board |
| GMSK | Gaussian Minimum Shift Keying |
| GPIB | General Purpose Interface Bus |
| GSM | Global System for Mobile Communications |
| IPUI | International Portable User Identity |
| IF | Intermediate Frequency |
| LCD | Liquid Crystal Display |
| LDO | Low Drop Output |
| LED | Light Emitting Diode |
| OPLL | Offset Phase Locked Loop |

1. INTRODUCTION

| | |
|--------|--|
| PAM | Power Amplifier Module |
| PCB | Printed Circuit Board |
| PGA | Programmable Gain Amplifier |
| PLL | Phase Locked Loop |
| PSTN | Public Switched Telephone Network |
| RF | Radio Frequency |
| RLR | Receiving Loudness Rating |
| RMS | Root Mean Square |
| RTC | Real Time Clock |
| SAW | Surface Acoustic Wave |
| SIM | Subscriber Identity Module |
| SLR | Sending Loudness Rating |
| SRAM | Static Random Access Memory |
| PSRAM | Pseudo SRAM |
| STMR | Side Tone Masking Rating |
| TA | Travel Adapter |
| TDD | Time Division Duplex |
| TDMA | Time Division Multiple Access |
| UART | Universal Asynchronous Receiver/Transmitter |
| VCO | Voltage Controlled Oscillator |
| VCTCXO | Voltage Control Temperature Compensated Crystal Oscillator |
| WAP | Wireless Application Protocol |

2. PERFORMANCE

2. PERFORMANCE

2.1 H/W Features

| Item | Feature | Comment |
|--------------------|--|---------|
| Standard Battery | Li-ion, 830mAh | |
| Stand by TIME | Up to 200 hrs : Paging Period 9, RSSI 85dBm | |
| Talk time | Up to 200min : GSM Tx Level 7 | |
| Stand by time | Up to 200 hours (Paging Period: 9, RSSI: -85 dBm) | |
| Charging time | Approx. 2 hours | |
| RX Sensitivity | GSM, EGSM: -109dBm, DCS: -109dBm | |
| TX output power | GSM, EGSM: 32.5dBm(Level 5), DCS , PCS: 29.5dBm(Level 0) | |
| GPRS compatibility | Class 10 | |
| SIM card type | 3V | |
| Display | LCD : CSTN 128 × 128 pixel 65K Color, SUB LCD MONO | |
| Status Indicator | Hard icons. Key Pad 0 ~ 9, #, *, Up/Down Navigation Key Menu Key, Clear Key Send Key, END/PWR Key Soft Key(Left/Right) | |
| ANT | Internal | |
| EAR Phone Jack | Yes (mono) | |
| PC Synchronization | NO | |
| Speech coding | EFR/FR/HR | |
| Data and Fax | Yes | |
| Vibrator | Yes | |
| Loud Speaker | Yes | |
| Voice Recoding | NO | |
| Microphone | Yes | |
| Speaker/Receiver | One way speaker | |
| Travel Adapter | Yes | |
| MIDI | 40 Poly (Mono SPK) | |
| Camera | NO | |

2. PERFORMANCE

2.2 Technical Specification

| Item | Description | Specification | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|-----------------|---|--------|--------|--------|--------|--------|--------|---|--------|------|----|--------|------|---|--------|------|----|--------|------|---|--------|------|----|--------|------|---|--------|------|----|--------|------|---|--------|------|----|-------|------|----|--------|------|----|-------|------|----|--------|------|----|-------|------|----|--------|------|----|-------|------|
| 1 | Frequency Band | GSM • TX: 890 + n x 0.2 MHz • RX: 935 + n x 0.2 MHz (n=1~124) EGSM • TX: 890 + (n-1024) x 0.2 MHz • RX: 935 + (n-1024) x 0.2 MHz (n=975~1024) DCS • TX: 1710 + (n-512) x 0.2 MHz • RX: 1805 + (n-512) x 0.2 MHz (n=512~885) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Phase Error | RMS < 5 degrees Peak < 20 degrees | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Frequency Error | < 0.1 ppm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Power Level | GSM, EGSM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table><tr><td>Level</td><td>Power</td><td>Toler.</td><td>Level</td><td>Power</td><td>Toler.</td></tr><tr><td>5</td><td>33 dBm</td><td>±2dB</td><td>13</td><td>17 dBm</td><td>±3dB</td></tr><tr><td>6</td><td>31 dBm</td><td>±3dB</td><td>14</td><td>15 dBm</td><td>±3dB</td></tr><tr><td>7</td><td>29 dBm</td><td>±3dB</td><td>15</td><td>13 dBm</td><td>±3dB</td></tr><tr><td>8</td><td>27 dBm</td><td>±3dB</td><td>16</td><td>11 dBm</td><td>±5dB</td></tr><tr><td>9</td><td>25 dBm</td><td>±3dB</td><td>17</td><td>9 dBm</td><td>±5dB</td></tr><tr><td>10</td><td>23 dBm</td><td>±3dB</td><td>18</td><td>7 dBm</td><td>±5dB</td></tr><tr><td>11</td><td>21 dBm</td><td>±3dB</td><td>19</td><td>5 dBm</td><td>±5dB</td></tr><tr><td>12</td><td>19 dBm</td><td>±3dB</td><td></td><td></td><td></td></tr></table> | Level | Power | Toler. | Level | Power | Toler. | 5 | 33 dBm | ±2dB | 13 | 17 dBm | ±3dB | 6 | 31 dBm | ±3dB | 14 | 15 dBm | ±3dB | 7 | 29 dBm | ±3dB | 15 | 13 dBm | ±3dB | 8 | 27 dBm | ±3dB | 16 | 11 dBm | ±5dB | 9 | 25 dBm | ±3dB | 17 | 9 dBm | ±5dB | 10 | 23 dBm | ±3dB | 18 | 7 dBm | ±5dB | 11 | 21 dBm | ±3dB | 19 | 5 dBm | ±5dB | 12 | 19 dBm | ±3dB | | | |
| | | Level | Power | Toler. | Level | Power | Toler. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 5 | 33 dBm | ±2dB | 13 | 17 dBm | ±3dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 6 | 31 dBm | ±3dB | 14 | 15 dBm | ±3dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 7 | 29 dBm | ±3dB | 15 | 13 dBm | ±3dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 8 | 27 dBm | ±3dB | 16 | 11 dBm | ±5dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 9 | 25 dBm | ±3dB | 17 | 9 dBm | ±5dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 10 | 23 dBm | ±3dB | 18 | 7 dBm | ±5dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 11 | 21 dBm | ±3dB | 19 | 5 dBm | ±5dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 12 | 19 dBm | ±3dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | DCS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table><tr><td>Level</td><td>Power</td><td>Toler.</td><td>Level</td><td>Power</td><td>Toler.</td></tr><tr><td>0</td><td>30 dBm</td><td>±2dB</td><td>8</td><td>14 dBm</td><td>±3dB</td></tr><tr><td>1</td><td>28 dBm</td><td>±3dB</td><td>9</td><td>12 dBm</td><td>±4dB</td></tr><tr><td>2</td><td>26 dBm</td><td>±3dB</td><td>10</td><td>10 dBm</td><td>±4dB</td></tr><tr><td>3</td><td>24 dBm</td><td>±3dB</td><td>11</td><td>8 dBm</td><td>±4dB</td></tr><tr><td>4</td><td>22 dBm</td><td>±3dB</td><td>12</td><td>6 dBm</td><td>±4dB</td></tr><tr><td>5</td><td>20 dBm</td><td>±3dB</td><td>13</td><td>4 dBm</td><td>±4dB</td></tr><tr><td>6</td><td>18 dBm</td><td>±3dB</td><td>14</td><td>2 dBm</td><td>±5dB</td></tr><tr><td>7</td><td>16 dBm</td><td>±3dB</td><td>15</td><td>0 dBm</td><td>±5dB</td></tr></table> | Level | Power | Toler. | Level | Power | Toler. | 0 | 30 dBm | ±2dB | 8 | 14 dBm | ±3dB | 1 | 28 dBm | ±3dB | 9 | 12 dBm | ±4dB | 2 | 26 dBm | ±3dB | 10 | 10 dBm | ±4dB | 3 | 24 dBm | ±3dB | 11 | 8 dBm | ±4dB | 4 | 22 dBm | ±3dB | 12 | 6 dBm | ±4dB | 5 | 20 dBm | ±3dB | 13 | 4 dBm | ±4dB | 6 | 18 dBm | ±3dB | 14 | 2 dBm | ±5dB | 7 | 16 dBm | ±3dB | 15 | 0 dBm | ±5dB |
| | | Level | Power | Toler. | Level | Power | Toler. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 30 dBm | ±2dB | 8 | 14 dBm | ±3dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | 28 dBm | ±3dB | 9 | 12 dBm | ±4dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2 | 26 dBm | ±3dB | 10 | 10 dBm | ±4dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3 | 24 dBm | ±3dB | 11 | 8 dBm | ±4dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 4 | 22 dBm | ±3dB | 12 | 6 dBm | ±4dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 5 | 20 dBm | ±3dB | 13 | 4 dBm | ±4dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 6 | 18 dBm | ±3dB | 14 | 2 dBm | ±5dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 16 dBm | ±3dB | 15 | 0 dBm | ±5dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

2. PERFORMANCE

| Item | Description | Specification | |
|------|--|----------------------------|------------|
| 5 | Output RF Spectrum (due to modulation) | GSM, EGSM | |
| | | Offset from Carrier (kHz). | Max. dBc |
| | | 100 | +0.5 |
| | | 200 | -30 |
| | | 250 | -33 |
| | | 400 | -60 |
| | | 600~ <1,200 | -60 |
| | | 1,200~ <1,800 | -60 |
| | | 1,800~ <3,000 | -63 |
| | | 3,000~ <6,000 | -65 |
| | | 6,000 | -71 |
| | | DCS | |
| | | Offset from Carrier (kHz). | Max. dBc |
| | | 100 | +0.5 |
| | | 200 | -30 |
| | | 250 | -33 |
| | | 400 | -60 |
| | | 600~ <1,200 | -60 |
| | | 1,200~ <1,800 | -60 |
| | | 1,800~ <3,000 | -65 |
| | | 3,000~ <6,000 | -65 |
| | | 6,000 | -73 |
| 6 | Output RF Spectrum (due to switching transient) | GSM, EGSM | |
| | | Offset from Carrier (kHz) | Max. (dBm) |
| | | 400 | -19 |
| | | 600 | -21 |
| | | 1,200 | -21 |
| | | 1,800 | -24 |

2. PERFORMANCE

| Item | Description | Specification | | |
|------|--|---|----------|------------|
| 6 | Output RF Spectrum (due to switching transient) | DCS | | |
| | | Offset from Carrier (kHz). | | Max. (dBm) |
| | | 400 | | -22 |
| | | 600 | | -24 |
| | | 1,200 | | -24 |
| | | 1,800 | | -27 |
| 7 | Spurious Emissions | Conduction, Emission Status | | |
| 8 | Bit Error Ratio | GSM, EGSM BER (Class II) < 2.439% @-102 dBm DCS BER (Class II) < 2.439% @-100 dBm | | |
| 9 | RX Level Report Accuracy | ±3 dB | | |
| 10 | SLR | 8 ±3 dB | | |
| 11 | Sending Response | Frequency (Hz) | Max.(dB) | Min.(dB) |
| | | 100 | -12 | - |
| | | 200 | 0 | - |
| | | 300 | 0 | -12 |
| | | 1,000 | 0 | -6 |
| | | 2,000 | 4 | -6 |
| | | 3,000 | 4 | -6 |
| | | 3,400 | 4 | -9 |
| | 4,000 | 0 | - | |
| 12 | RLR | 2 ±3 dB | | |
| 13 | Receiving Response | Frequency (Hz) | Max.(dB) | Min.(dB) |
| | | 100 | -12 | - |
| | | 200 | 0 | - |
| | | 300 | 2 | -7 |
| | | 500 | * | -5 |
| | | 1,000 | 0 | -5 |
| | | 3,000 | 2 | -5 |
| | | 3,400 | 2 | -10 |
| | | 4,000 | 2 | |
| | | * Mean that Adopt a straight line in between 300 Hz and 1,000 Hz to be Max. level in the range. | | |

2. PERFORMANCE

| Item | Description | Specification | |
|------|-------------------------------------|--|------------------------|
| 14 | STMR | 13 ±5 dB | |
| 15 | Stability Margin | > 6 dB | |
| 16 | Distortion | dB to ARL (dB) | Level Ratio (dB) |
| | | -35 | 17.5 |
| | | -30 | 22.5 |
| | | -20 | 30.7 |
| | | -10 | 33.3 |
| | | 0 | 33.7 |
| | | 7 | 31.7 |
| | | 10 | 25.5 |
| 17 | Side Tone Distortion | Three stage distortion < 10% | |
| 18 | System frequency (13 MHz) tolerance | ≤ 2.5ppm | |
| 19 | 32.768KHz tolerance | ≤ 30ppm | |
| 20 | Ringer Volume | At least 65 dBspl under below conditions: 1. Ringer set as ringer. 2. Test distance set as 50 cm | |
| 21 | Charge Current | Fast Charge : < 430 mA Slow Charge : < 160 mA | |
| 22 | Antenna Display | Antenna Bar Number | Power |
| | | 5 | -86 dBm ~ |
| | | 5-4 | -89.5 dBm ~ -86 dBm |
| | | 4-3 | -94.5 dBm ~ -89.5 dBm |
| | | 3-2 | -99.5 dBm ~ -94.5 dBm |
| | | 2-1 | -104.5 dBm ~ -99.5 dBm |
| | | 1-0 | ~ -105 dBm |
| 23 | Battery Indicator | Battery Bar Number | Voltage |
| | | 1-0 | 3.55 ~ 3.65 V |
| | | 2-1 | 3.65 ~ 3.75 V |
| | | 3-2 | 3.71 ~ 3.81 V |
| | | 4-3 | 3.82 ~ 3.92 V |
| | | 4 | 3.88 V ~ |
| 24 | Low Voltage Warning | 3.62 ±0.05V (Call) | |
| | | 3.45 ±0.05V (Standby) | |

2. PERFORMANCE

| Item | Description | Specification |
|------|--------------------------|---|
| 25 | Forced shut down Voltage | 3.35 ± 0.05 V |
| 26 | Battery Type | 1 Li-ion Battery Standard Voltage = 3.7 V Battery full charge voltage = 4.2 V Capacity: 830mAh |
| 27 | Travel Charger | Switching-mode charger Input: 100 ~ 240 V, 50/60 Hz Output: 5.2 V, 800 mA |

3. TECHNICAL BRIEF

3. TECHNICAL BRIEF

3.1 KG120 Block Diagram

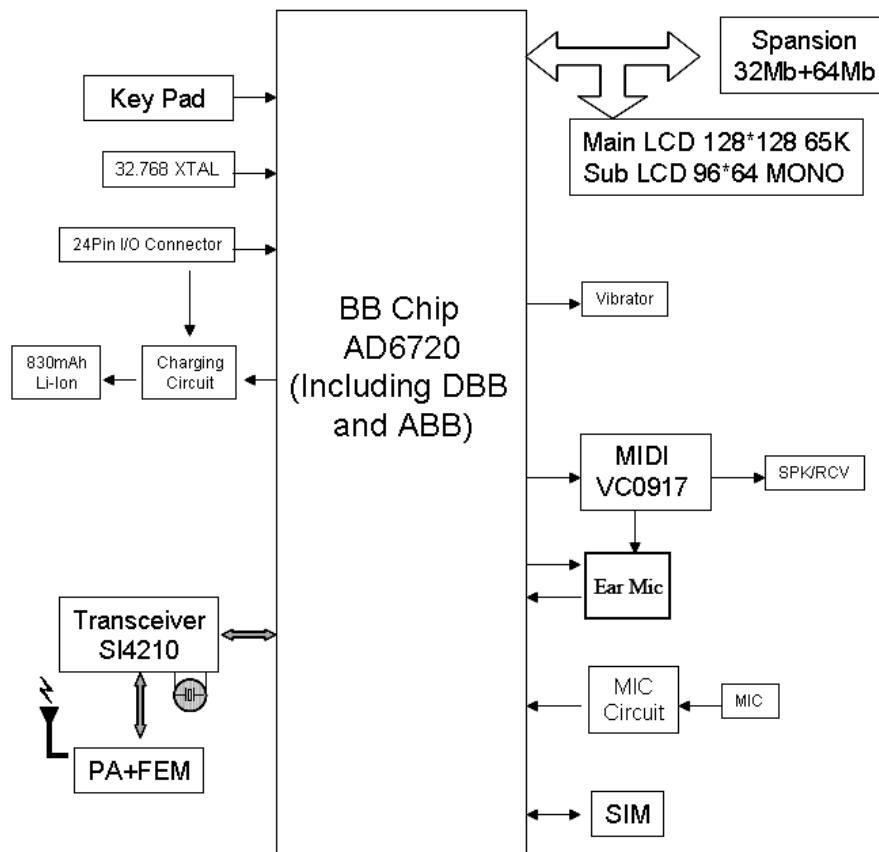


Figure 3-1 TOP LEVEL BLOCK OF KG120

The Figure 3-1 shows the top level block diagram of KG120, it contains RF and BB part. The following list is the detailed.

1. AD6720:ADI baseband chipset,
 2. PA+FEM:RF3166 is The PAM and HWXQ515 is the FEM
 3. Transceiver: SI4210
 4. Flash: Spansion 32Mb+64Mb
 5. Others
- A: 22 keys
B: 128*128 65K CSTN Main LCD and 96*64 MONO FSTN Sub LCD
C: Vibrator, Mic, Speaker, Ear-jack
D: Sim socket
E: Battery connector

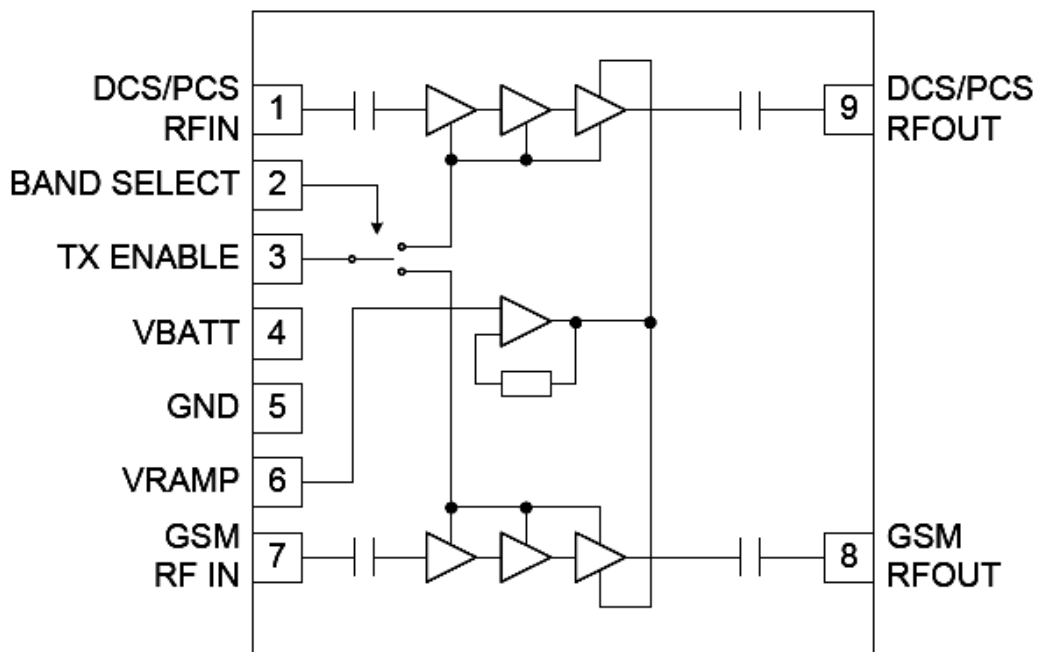
3. TECHNICAL BRIEF

3.2 RF Part Introductions

The RF part consists of a power amplifier part, a transmitter part, a crystal reference system, and an ant-switch part.

3.2.1 Power Amplifier (RF3166, U102)

The RF3166 is a high-power, high-efficiency power amplifier module with integrated power control that provides over 50dB of control range. The device is a self-contained 6mmx6mm module with 50Ω input and output terminals. The device is designed for use as the final RF amplifier in GSM850, EGSM900, DCS and PCS handheld digital cellular equipment and other applications in the 824MHz to 849MHz, 880MHz to 915MHz, 1710MHz to 1785MHz and 1850MHz to 1910MHz bands. The RF3166 incorporates RFMD's latest VBATT tracking circuit, which monitors battery voltage and prevents the power control loop from reaching saturation. The VBATT tracking circuit eliminates the need to monitor battery voltage, thereby minimizing switching transients. The RF3166 requires no external routing or external components, simplifying layout and reducing board space.



Functional Block Diagram

Figure 3-2 Functional Block Diagram

3. TECHNICAL BRIEF

Pin Out Top Down View

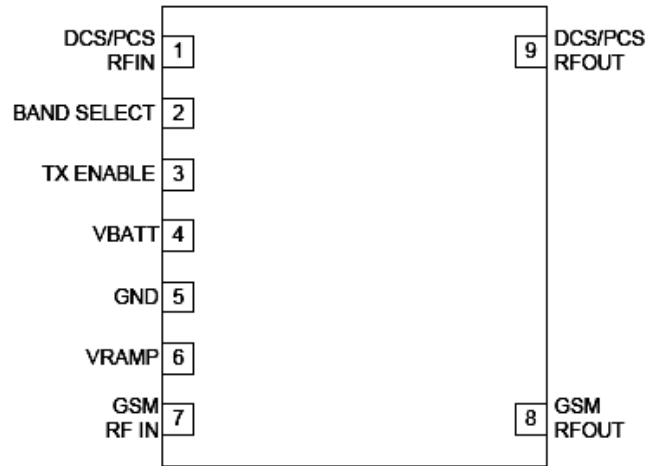


Figure 3-3 RF3166 PAM Pin Configuration-9-Pin

Table 3-1. RF3166 Pin Names and Signal Descriptions

| PIN | Function | Description |
|----------|-------------|--|
| 1 | DCS/PCS IN | RF input to the DCS band. This is a 50ohm input |
| 2 | BAND SELECT | Logic Low enable GSM band Logic HIGH enable DCS/PCS band |
| 3 | TX ENABLE | Enable PA module for operation with a logic high |
| 4 | VBATT | Power supply for the module |
| 5 | GND | |
| 6 | VRAMP | Ramping signal from DAC. No external filtering is required |
| 7 | GSM IN | 50ohm input pin for GSM band |
| 8 | GSM OUT | 50ohm output pin for GSM band |
| 9 | DCS/PCS OUT | 50ohm output pin for DCS/PCS band |
| Pkg Base | GND | |

3. TECHNICAL BRIEF

3.2.2 Transceiver (SI4210, U103)

The SI4210 transceiver is a complete RF front end for multi-band GSM and GPRS wireless communications. The receive section interfaces between the RF band-select SAW filters and the baseband subsystem. The Aero II receiver leverages a proven digital low-IF architecture and enables a universal baseband interface without the need for complex dc offset compensation. The transmit section of Aero II provides a complete upconversion path from the baseband subsystem to the power amplifier (PA) using an offset phase-locked loop (OPLL) integrated with Silicon Laboratories' patented synthesizer technology. All sensitive components, such as TX/RV VCOs, loop filters, tuning inductors, and varactors are completely integrated into a single integrated circuit. The Aero II transceiver includes a digitally-controlled crystal oscillator (DCXO) and completely integrates the reference oscillator and varactor functionality.

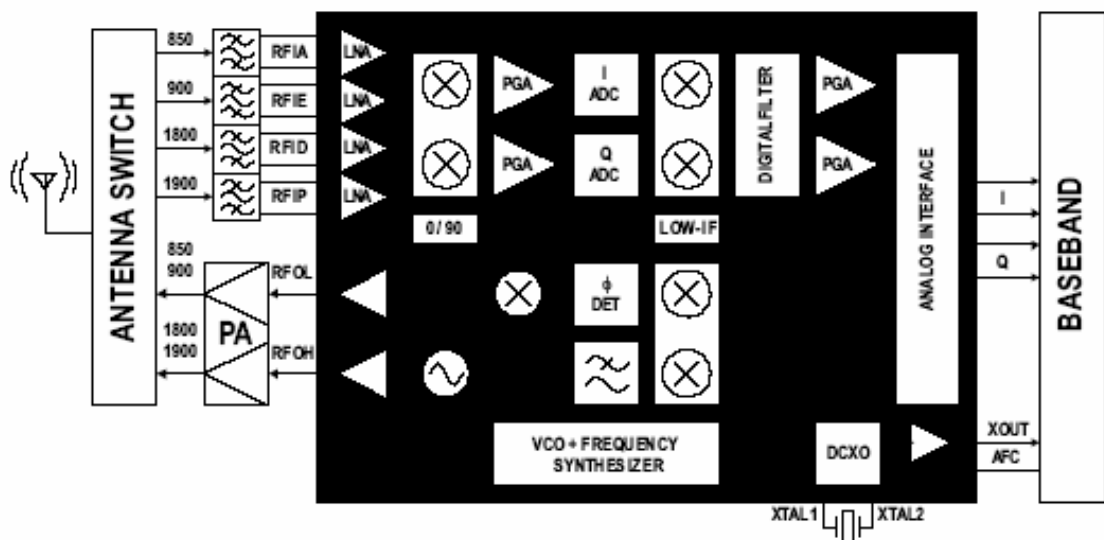


Figure 3-4 Functional Block Diagram

3. TECHNICAL BRIEF

Table 3-2. SI4210 Pin Names and Signal Descriptions

| Pin | Number(s) | Name |
|-------------|-------------|-----------------------------------|
| 1 | SCLK | Serial clock input |
| 2 | SEN | Serial enable input (active low) |
| 3 | SDIO | Serial data input/output |
| 4,5 | BQP,BQN | Transmit/receiver Q input/output |
| 6,7 | BIP,BIN | Transmit/receiver I input/output |
| 8 | XOUT | Clock output to baseband |
| 9 | PDN | Power down input |
| 10 | RESET | Reset pin |
| 11 | Vio | Interface supply voltage |
| 12,13,28,29 | VDD | supply voltage |
| 14,PAD | GND | Ground |
| 15 | RFOL | GSM 850 and EGSM 900 output |
| 16 | RFOH | DCS 1800 and PCS 1900 output |
| 17,18 | RFIPP,RFIPN | PCS 1900 LNA input |
| 19,20 | RFIDP,RFIDN | DCS 1800 LNA input, |
| 21,22 | RFIEP,RFIEN | EGSM 900 LNA input |
| 23,24 | RFIAP,RFIAN | GSM 850 LNA input |
| 25 | XMODE | DCXO/VC-TCXO mode enable |
| 26 | XDIV | XOUT frequency select input |
| 27 | AFC | Baseband analog AFC input |
| 30,31 | XTAL2,XTAL1 | Crystal output and input |
| 32 | XEN | XOUT pin enable |

3. TECHNICAL BRIEF

3.2.3 FEM (HWXQ515,U104)

Table 3-3 Band SW Logic Table

| Select Mode | Vc(GSM) | Vc(DCS/PCS) |
|-------------|---------|-------------|
| GSM-Rx | Low | Low |
| GSM-Tx | High | Low |
| DCS-Rx | Low | Low |
| PCS-Rx | Low | Low |
| DCS/PCS-Tx | Low | High |

3.2.4 26MHz Clock (TG-5000LA, X100)

The 26MHz clock (X100) consists of a TCXO(Temperature Compensated Crystal Oscillator) which oscillator at a frequency of 26 MHz. It is used within the RF part and DBB part.

3.3 Baseband Introductions

3.3.1 Baseband Processor (AD6720 , U201)

- AD6720 is an ADI designed processor
- AD6720 consists of
 1. Control Processor Subsystem including:
 - 32-bit MCU ARM7TDMI Control Processor
 - 39 MHz operation at 1.8V
 - 1Mb of on-chip System SRAM Memory
 2. DSP Subsystem including:
 - 16-bit Fixed Point DSP Processor
 - 91 MIPS at 1.8V
 - Data and Program SRAM
 - Program Instruction Cache
 - Full Rate, Enhanced Full Rate and Half Rate
 - Speech Encoding/Decoding
 - Capable of Supporting AMR & PDC Speech Algorithms
 3. Peripheral Functions
 - Parallel and Serial Display Interface
 - Keypad Interface
 - Flash Memory Interface
 - Page-Mode Flash Support
 - 1.8V and 3.0V, 64 kbps SIM Interface
 - Universal System Connector Interface
 - Data Services Interface
 - Battery Interface (e.g. Dallas)
 4. Other
 - Supports 13 MHz and 26 MHz Input Clocks
 - 1.8V Typical Core Operating Voltages
 - 289-Ball Package (12x12mm) , 0.65mm Ball pitch
 5. The AD6720 baseband transmit section supports the following
 - mobile station GMSK modulation power classes:
 - GSM 900/850 power classes 4 and 5,
 - DCS 1800 power classes 1 and 2, and
 - PCS 1900 power classes 1 and 2

3.3.2 Interconnection with external devices

A. RTC block interface

Countered by external X-TAL

The X-TAL oscillates 32.768KHz

3. TECHNICAL BRIEF

B. LCD module interface

| Signals | Description |
|------------|---|
| LCD_CS/ | Main LCD driver chip enable. |
| LCD_REST/ | This pin resets LCD module. |
| LWR/ | Enable writing to LCD Driver. |
| SUBLCD_CS/ | SUB LCD Driver chip enable |
| LCD_ID_CHK | This pin determines the LCD module type |
| A1 | Select 16bits interface mode for MAIN LCD |

Table 3-4: LCD Pin Description

The backlight of LCD module is controlled by AD6720 via AAT3122, U301. The Control signals related to Backlight LED are given below.

| Signals | Description |
|-------------|----------------------------------|
| LCD_BACK_EN | Control LCD backlight in 2 steps |
| MLED_A | Current source backlight LED |

Table 3-5: LCD Backlight LED Control

There are two steps of the LCD back light setting, bright and middle level, this two levels setting will save power in some condition.

C. RF interface

The AD6720 control RF parts through PA_BAND, ANT_SW1, ANT_SW2, CLKON, PA_EN, S_EN, S_DATA, S_CLK, RF_PWR_DWN.

3. TECHNICAL BRIEF

| Signals | Description |
|------------|----------------------------|
| PA_BAND | PAM Band Select |
| ANT_SW1 | Antenna switch Band Select |
| ANT_SW2 | Antenna switch Band Select |
| RF_PWR_DWN | Power down input |
| CLKON | RF LDO Enable/Disable |
| PA_EN | PAM Enable/Disable |
| S_EN | PLL Enable/Disable |
| S_DATA | Serial Data to PLL |
| S_CLK | Clock to PLL |

Table 3-6. RF Control Signals Description

D. SIM interface

The AD6720 provides SIM Interface Module. The AD6720 checks status periodically during established call mode whether SIM card is inserted or not, but it doesn't check during deep Sleep mode. In order to communicate with SIM card, 3 signals SIM_DATA, SIM_CLK, SIM_RST(GPIO_23) are required. The descriptions about the signals are given by bellow Table 3-7 in detail.

| signals | Description |
|----------|--|
| SIM_DATA | This pin receives and sends data to SIM card. This model can support only 3.0 volt interface SIM card. |
| SIM_CLK | Clock 3.25MHz frequency |
| SIM_RST | Reset SIM block |

Table 3-7: SIM Control Signals Description

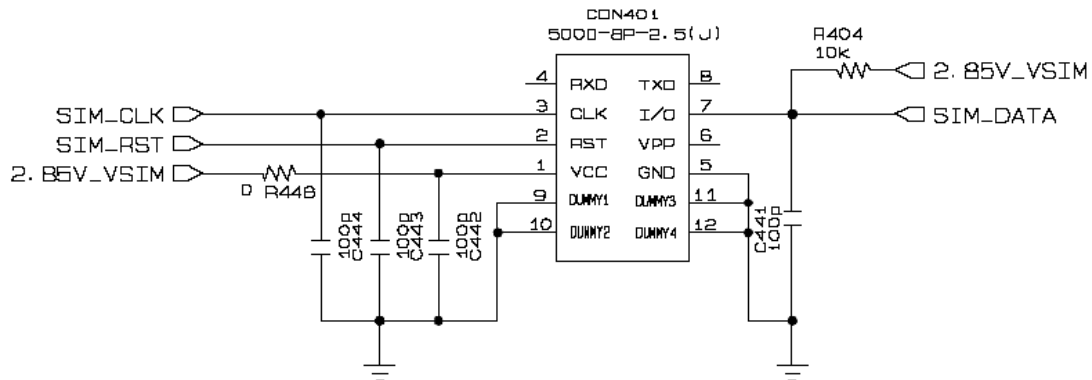


Figure 3-5: SIM Interface of AD6720

E. LDO Block

There are 8 LDOs in the AD6720. We only use 7 of them.

- VCORE : supplies Digital baseband Processor core and AD6720 digital core
- VMEM : supplies external memory and the interface to the external memory on the digital baseband processor (1.8V or 2.8V, 150mA)
- VEXT : supplies Radio digital interface and high voltage interface (2.8V, 170mA)
- VSIM : supplies the SIM interface circuitry on the digital processor and SIM card (2.85V, 20mA)
- VRTC : supplies the Real-Time Clock module (1.8 V, 20A)
- VMIC : supplies the microphone interface circuitry (2.5 V, 1 mA)
- VVCXO : supplies the voltage controlled crystal oscillator (2.75 V, 10 mA)

3.3.3 Battery Charging Block

1. It can be used to charge Lithium Ion batteries. Charger initialization, trickle charging, and Li-Ion charging control are implemented in hardware.

3. TECHNICAL BRIEF

2. Charging Process

- Check charger is inserted or not
- If AD6720 detects that Charger is inserted, the CC-CV charging starts.
- Exception : When battery voltage is lower than 3.2V, the precharge low current charge mode) starts firstly.
- And the battery voltage reach to 3.2V the CC-CV charging starts.

3. Pins used for charging at the AD6720 side.

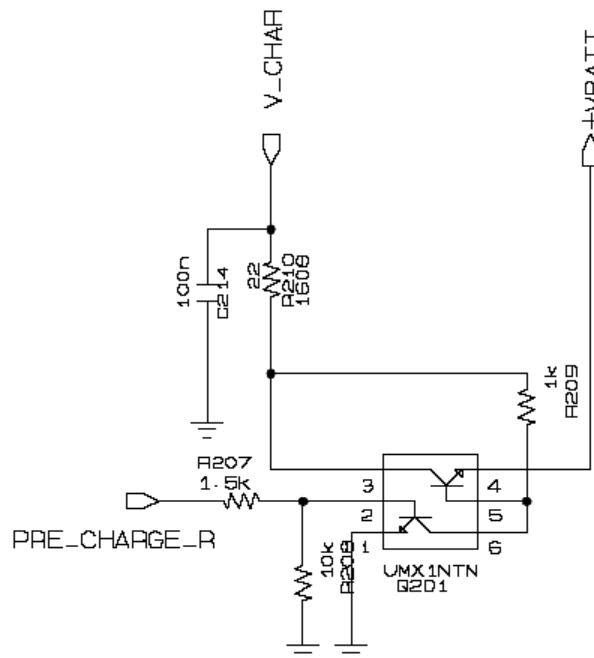
- VCHG : charger supply.
- GATEDRIVE : charge DAC output
- ISENSE : charge current sense input
- VBATSENSE : battery voltage sense input.
- BATTYPE : battery type identification input
- REFCHG : voltage reference output

4. TA (Travel Adaptor)

- Input voltage: AC 85V ~ 260V, 50~60Hz
- Output voltage: DC 5.2V (0.2 V)
- Output current: Max 800mA (50mA)

5. Battery

- Li-ion battery (Max 4.2V, Nom 3.7V)
- Standard battery: Capacity - 830mAh



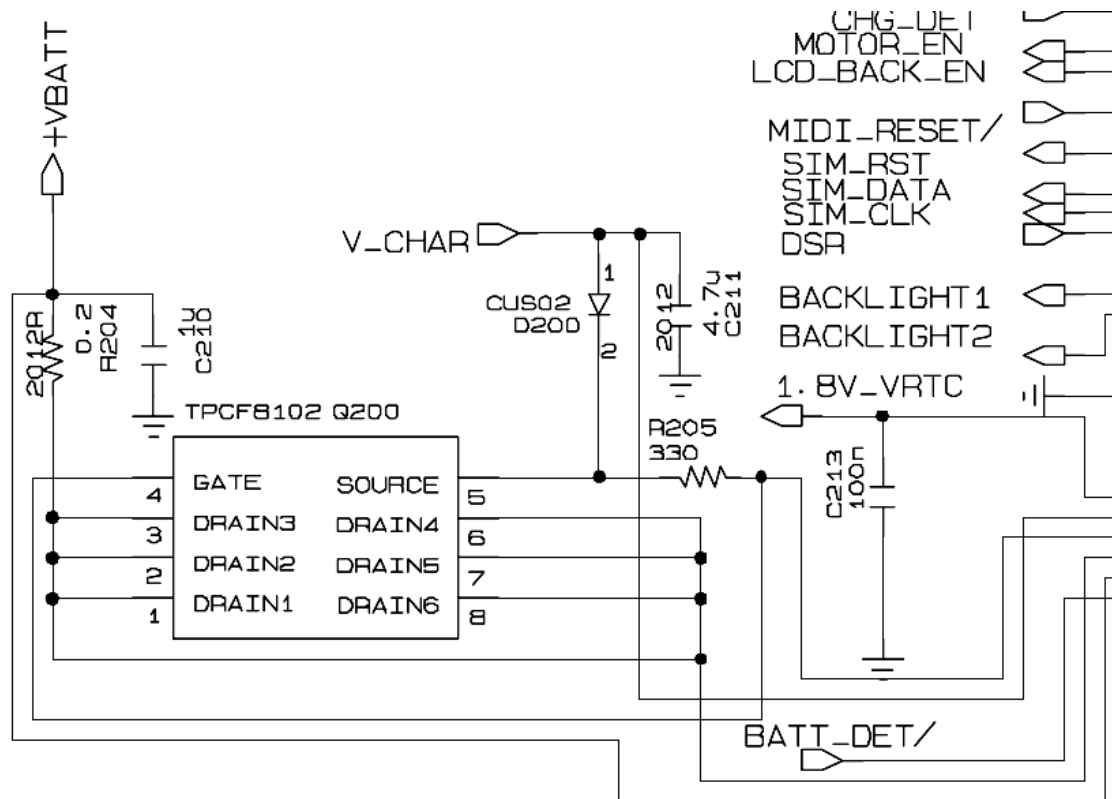


Figure 3-6: Circuit For Battery Charging

3.3.4 Display and Interface

- Main LCD&SUB LCD
Controlled by LCD_CS/,SUB_LCD_CS/,LCD_RESET/,LWR/,LCD_ID_CHK,
D[0:15] ports
- LCD_CS/ : MAIN LCD driver chip enable. MAIN LCD driver IC has own
CS pin
- LCD_RESET/ : This pin resets LCD module. This signal comes from AD6720 directly.
- SUB_LCD_CS: SUB LCD driver chip enable. SUB LCD driver IC has own CS pin
- LWR/ : Write control Signal .
- D[0:15] : Parallel data lines.
- LCD_ID_CHK: LCD type selection signals
- For using 65K color, data buses should be 16 bits.

| Properties | Spec. | Unit |
|------------|-------|------|
|------------|-------|------|

Active Screen Size 35.78*39.7*4.8 mm

Color Depth 65,536 colors

Resolution 128 X RGB X 128 dots

SUB LCD B/W 96*64 FSTN

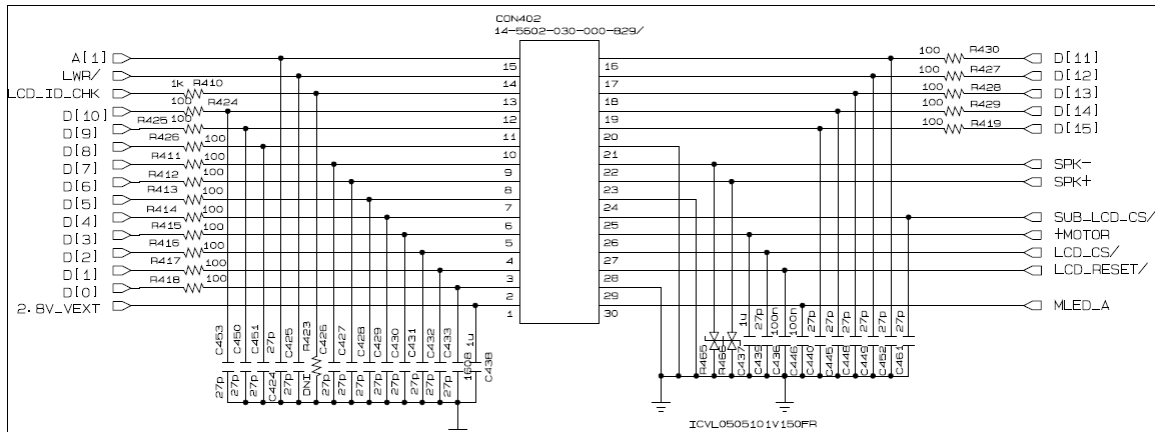
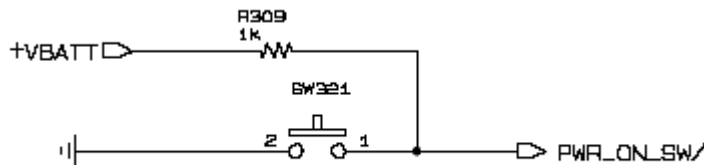


Figure 3-7: LCD Interface Circuit

3.3.5 Keypad Switches and Scanning

The key switches are metal domes, which make contact between two concentric pads on the keypad layer of the PCB when pressed. There are 21 switches, connected in a matrix of 5 rows by 5 columns and additional GPIO 35 for KEY_ROW5, as shown in Figure 3-8, except for the power switch (KB1), which is connected independently. Functions, the row and column lines of the keypad are connected to ports of AD6720. The columns are outputs, while the rows are inputs and have pull-up resistors built in. When a key is pressed, the corresponding row and column are connected together, causing the row input to go low and generate an interrupt. The columns/rows are then scanned by AD6720 to identify the pressed key.

KEYPADON



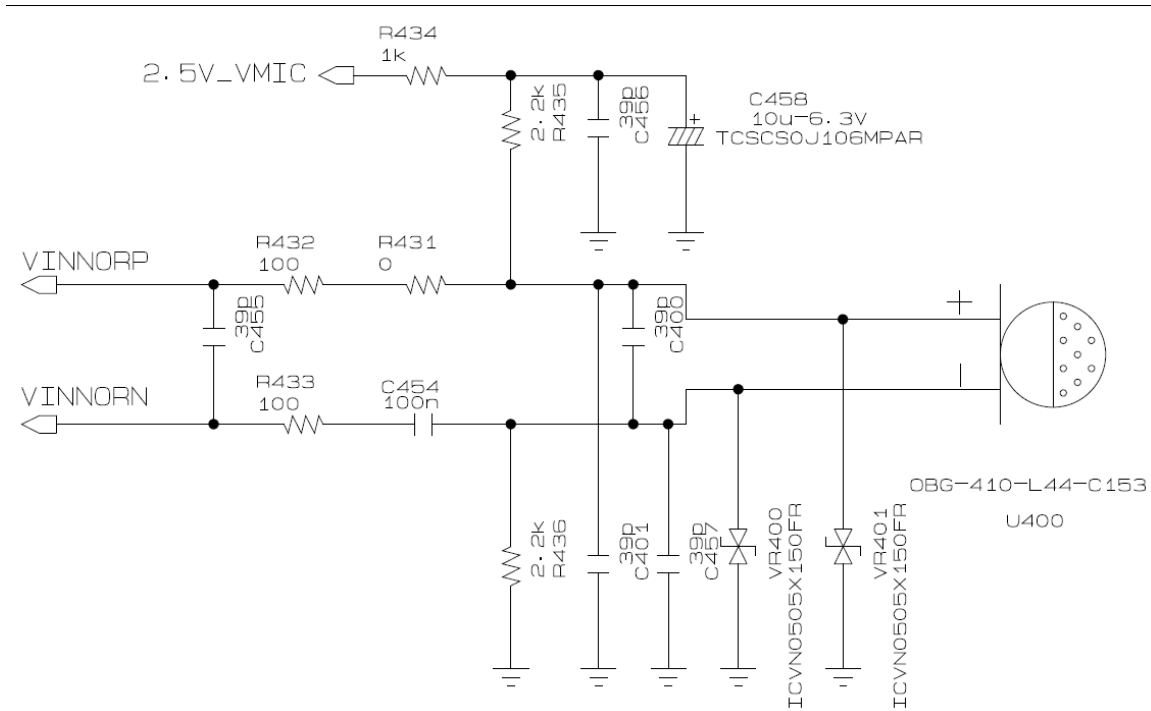


Figure 3-9: Connection Between Microphone And AD6720

3.3.7 Midi and Main Speaker

The Vimicro MIDI IC VC0917 Solution MIDI music player solution offering the following features:

- _ MIDI standards compliant
- _ MIDI files playable as polyphonic ringtones
- _ 40 notes polyphony
- _ MIDI file parser supports Standard MIDI (formats 0, 1 and 2), WAV.

The main speaker is driven directly by vc0917 SPOUT1 and SPOUT2 pins

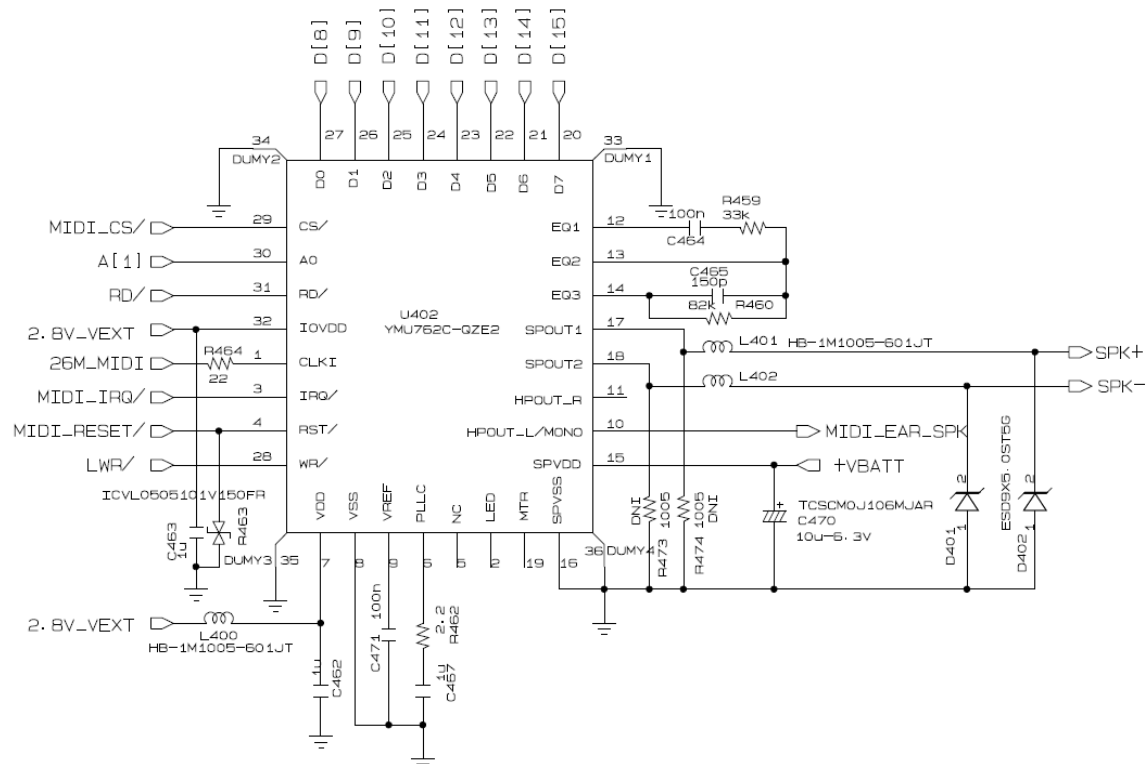


Figure 3-10: Main Speaker Circuit

3.3.8 Headset Interface

This type supports mono sound.

Switching from Receiver to Headset Jack

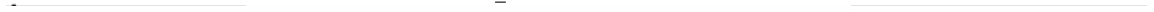
If jack is inserted, EAR_SENSE/ goes from high to low.

Audio path is switched from receiver to earphone by EAR_SENSE/ interrupt.

Switching from Headset Jack to Receiver

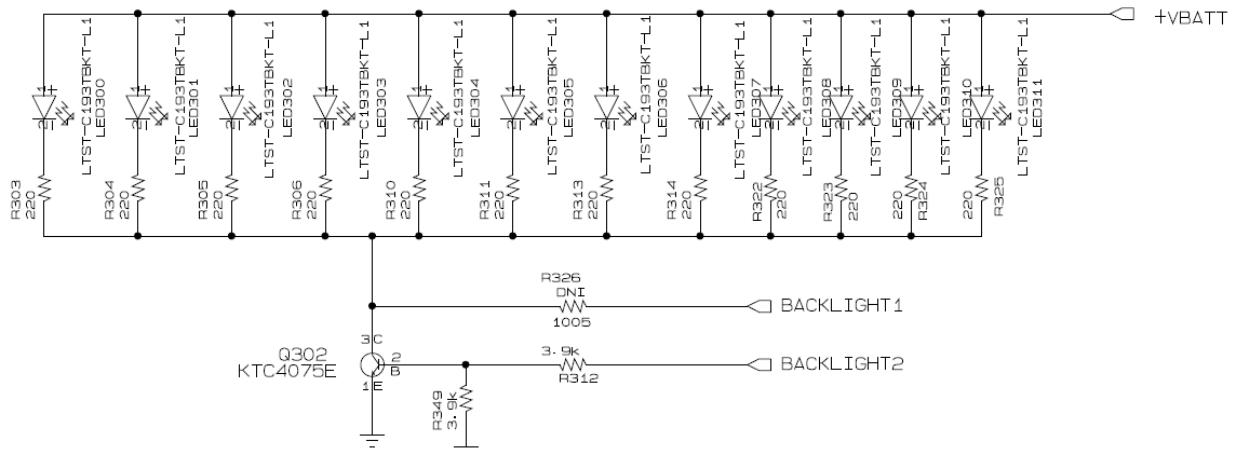
If jack is removed, EAR_SENSE/ goes from low to high.

Audio path is switched from earphone to receiver by EAR_SENSE/ interrupt.



In key back-light illumination, there are 12 Blue

Driven by BACKLIGHT2signal from AD6720.



3. TECHNICAL BRIEF

3.3.10 LCD Back-light Illumination

LCD backlight LEDs is controlled by AD6720 via AAT3122, U301.

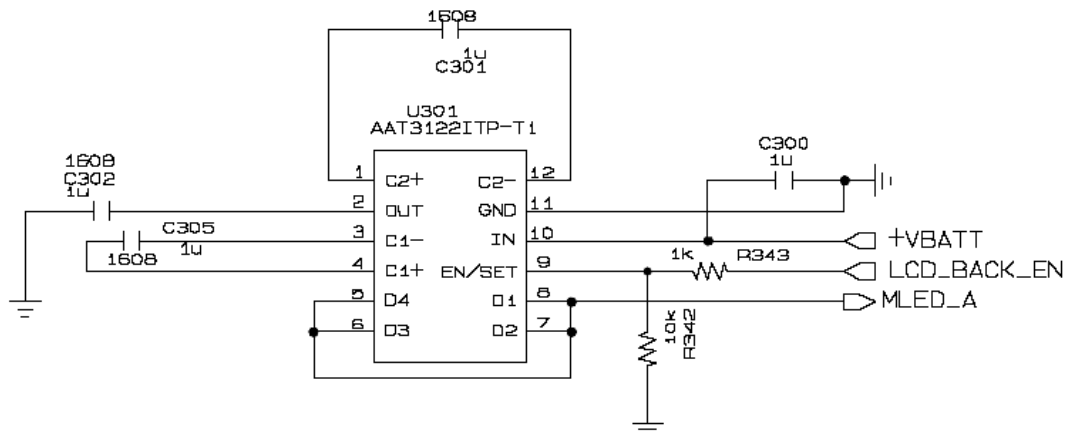


Figure 3-13: Main LCD Backlight Illumination

3.3.11 VIBRATOR

The vibrator is placed in the folder cover and contacted to LCD MODULE. The vibrator is driven from VIBRATOR (GPIO_0) of AD6720

3.3.12 FLIP S/W

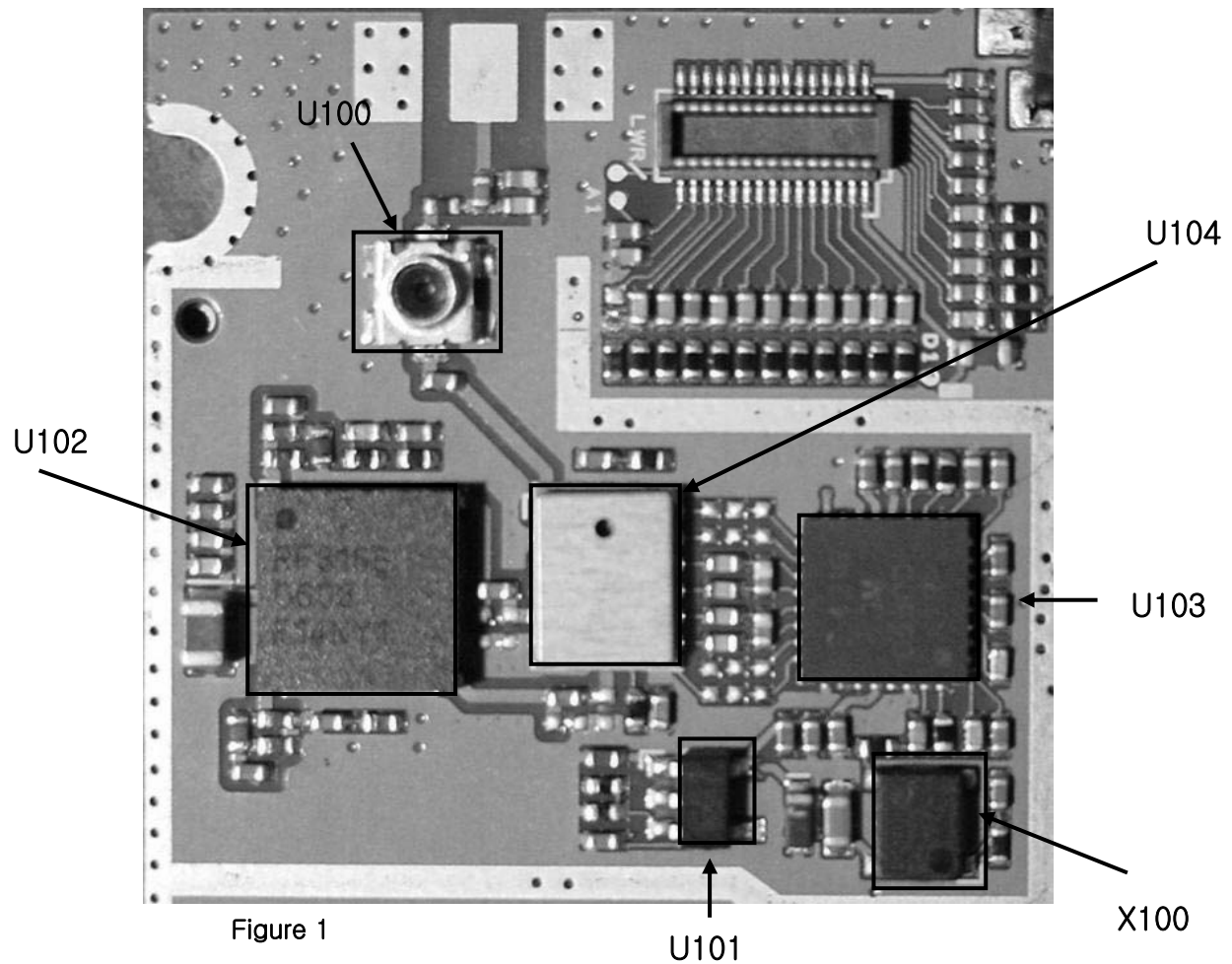
The flip s/w is placed in the A side of the PCB, close to the mic part. The flip s/w will send signal from FLIP/ pin to AD6720 if the folder flip.

Part 4

TROUBLE SHOOTING

4. TROUBLE SHOOTING

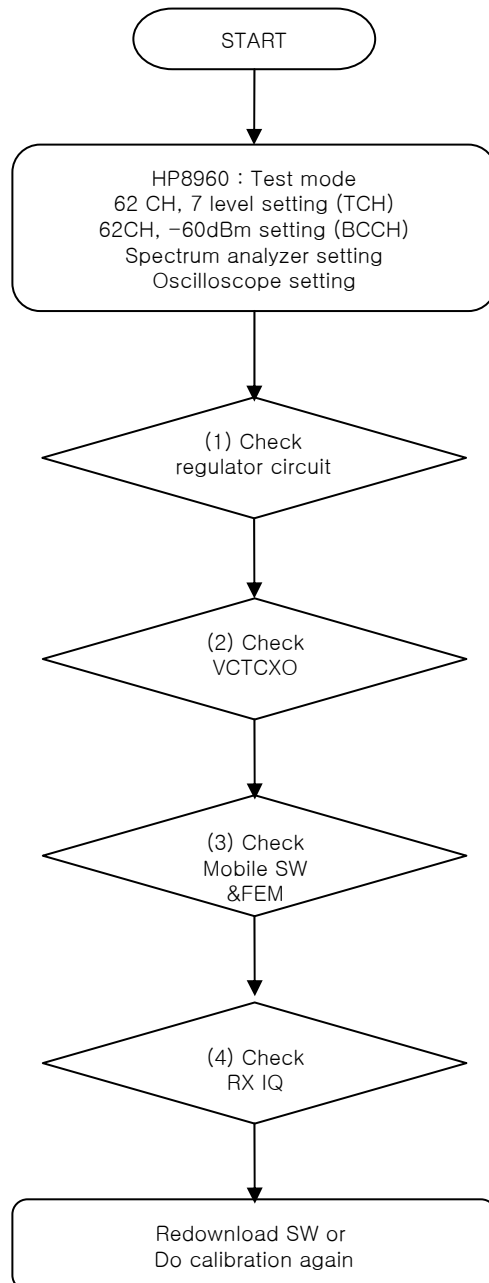
4.1 RF Components



| | |
|------|--------------------------|
| U102 | Power Amp Module(RF3166) |
| U103 | RF Main Chip (SI4210) |
| U101 | 2.85V Regulator |
| X100 | VCTXO, 26MHz Clock |
| U104 | FEM |
| U100 | Mobile Switch |

4.2 RX Trouble

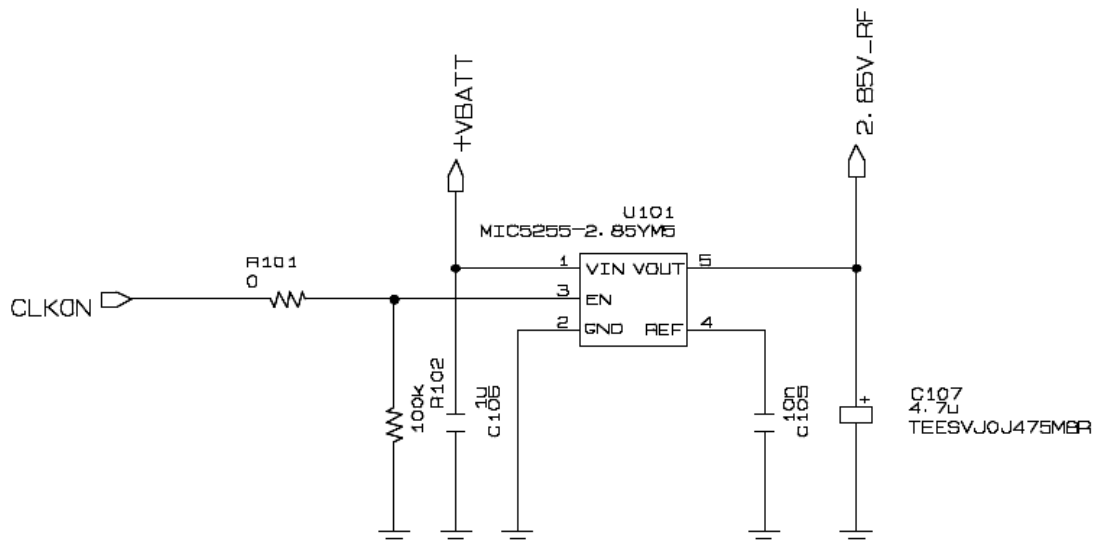
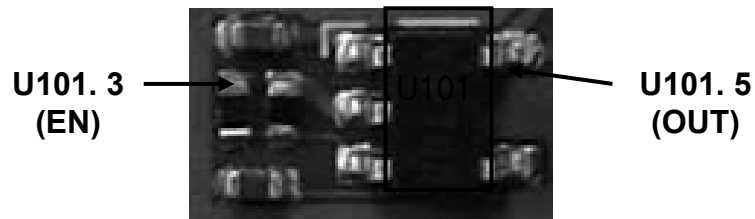
CHECKING FLOW



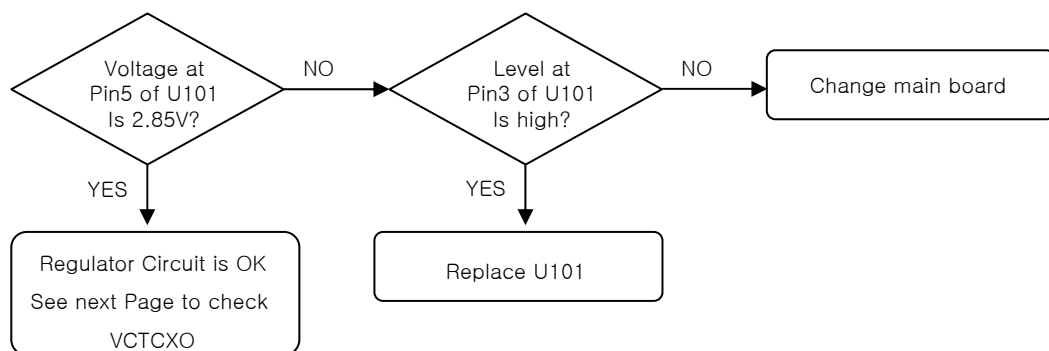
4. TROUBLE SHOOTING

(1) Checking Regulator Circuit

TEST POINT

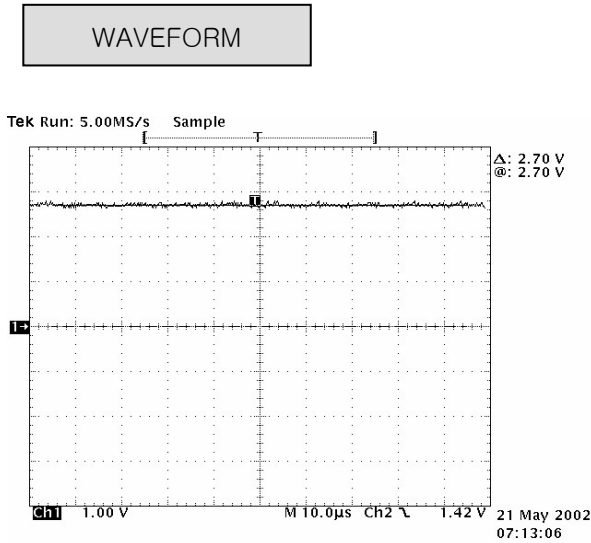
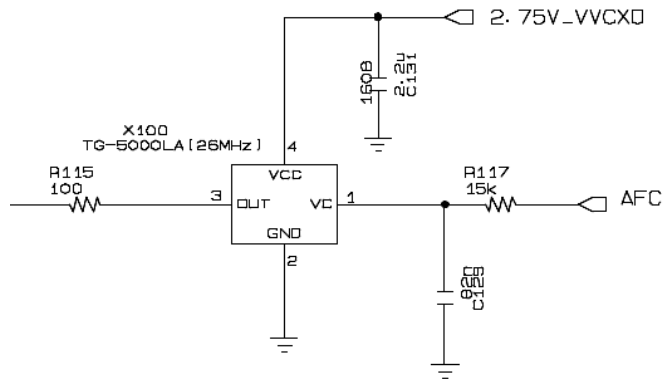
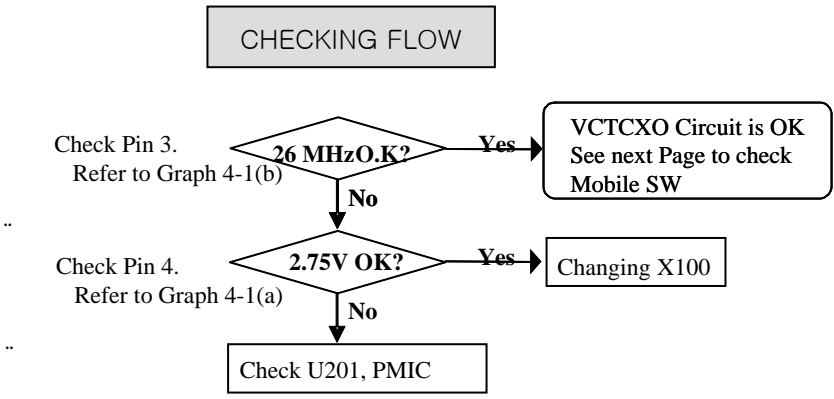
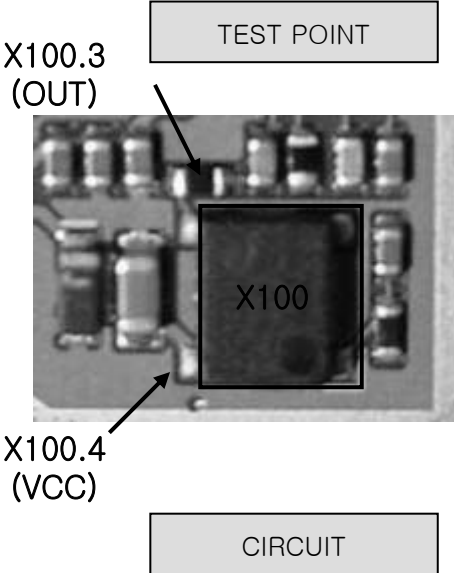


CHECKING FLOW

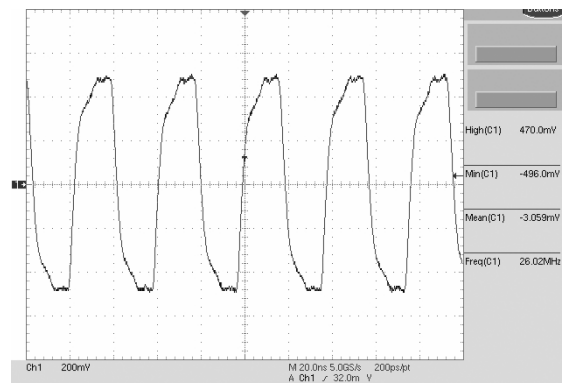


4. TROUBLE SHOOTING

(2) Checking VCTCXO Circuit



Graph 1(a)



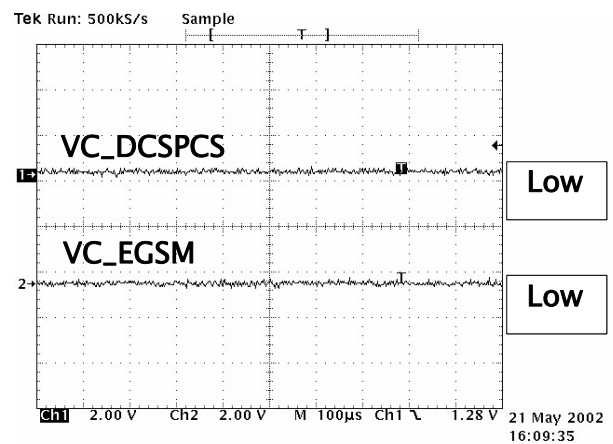
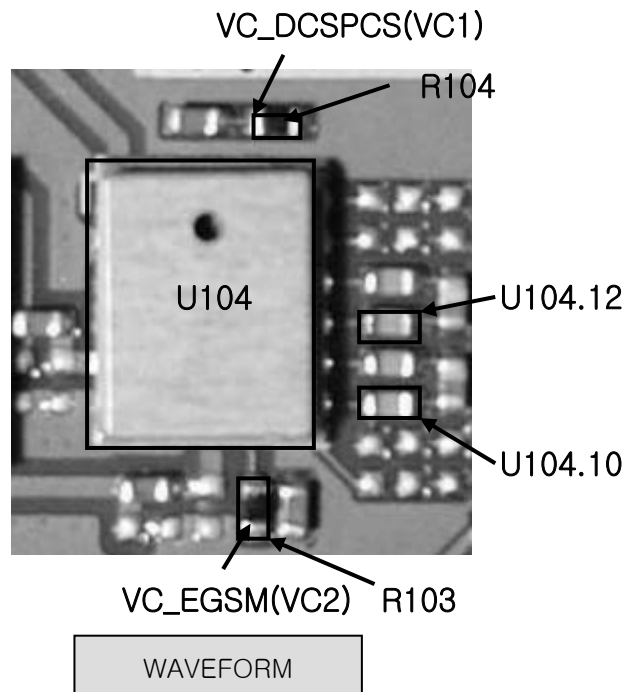
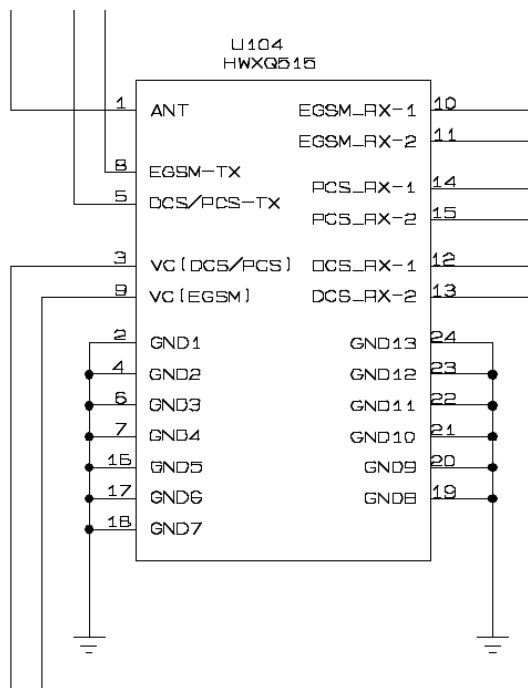
Graph 1(b)

4. TROUBLE SHOOTING

(3) Checking Mobile SW & FEM

TEST POINT

CIRCUIT



ANT SW Control GSM& DCS RX Mode

Graph 2

| Select Mode | Vc(EGSM) | Vc(DCS/PCS) |
|-------------|----------|-------------|
| EGSM-Rx | Low | Low |
| EGSM-Tx | High | Low |
| DCS -Rx | Low | Low |
| PCS -Rx | Low | Low |
| DCS/PCS -Tx | Low | High |

Table 1

4. TROUBLE SHOOTING

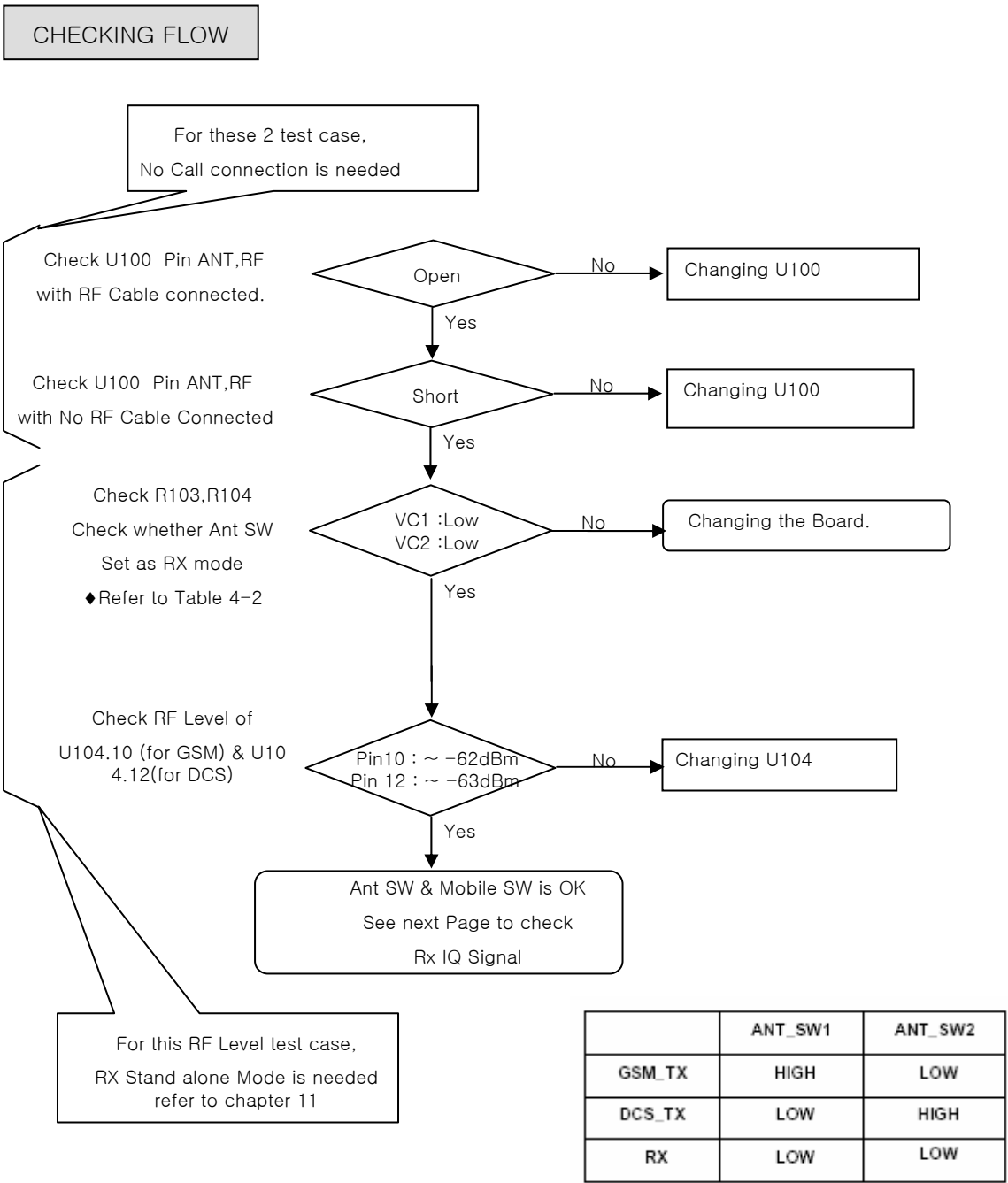


Table 4-2

TEST POINT

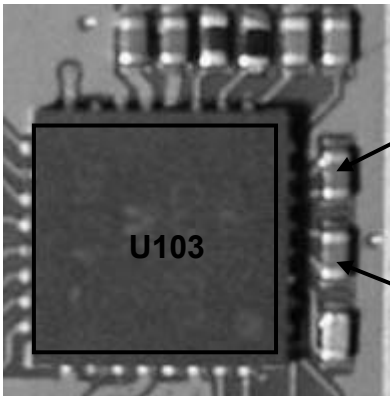
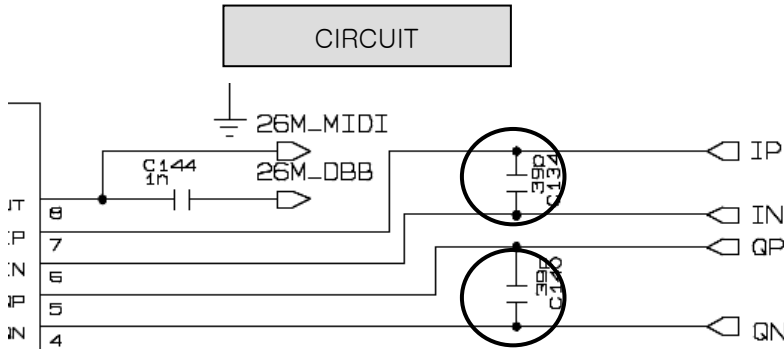
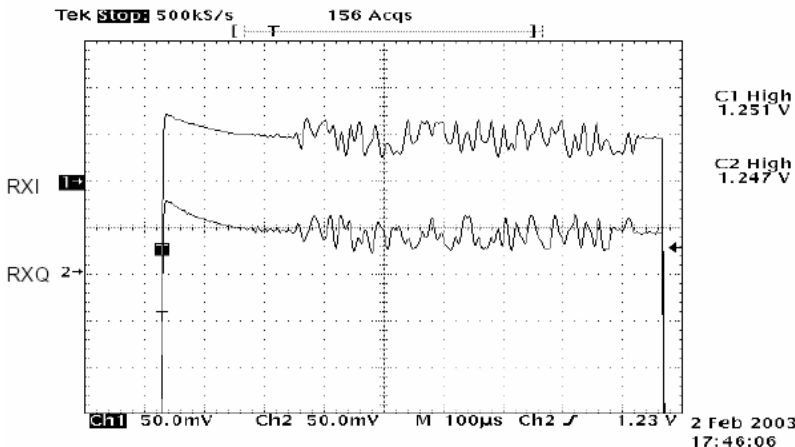


Figure 5

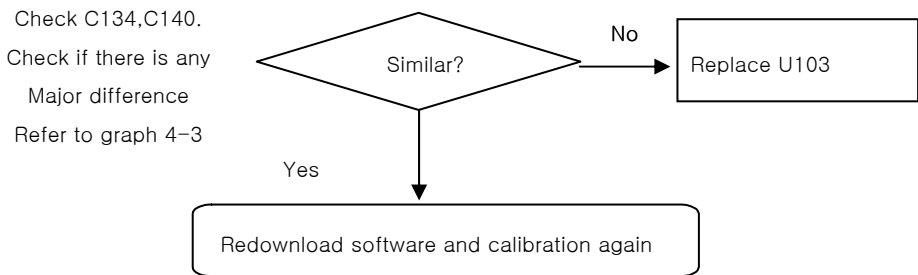


WAVEFORM



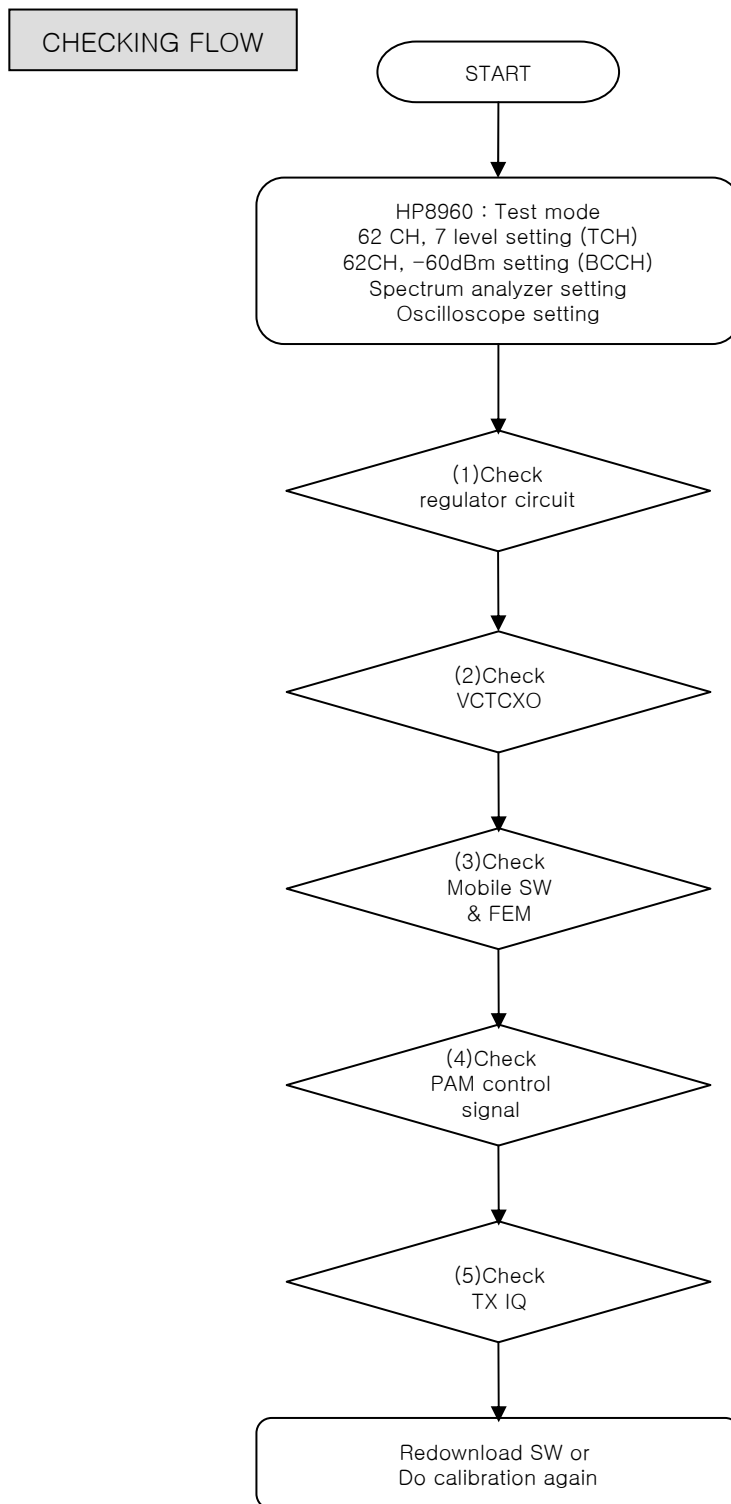
Graph 3

CHECKING FLOW



4. TROUBLE SHOOTING

4.3 TX Trouble

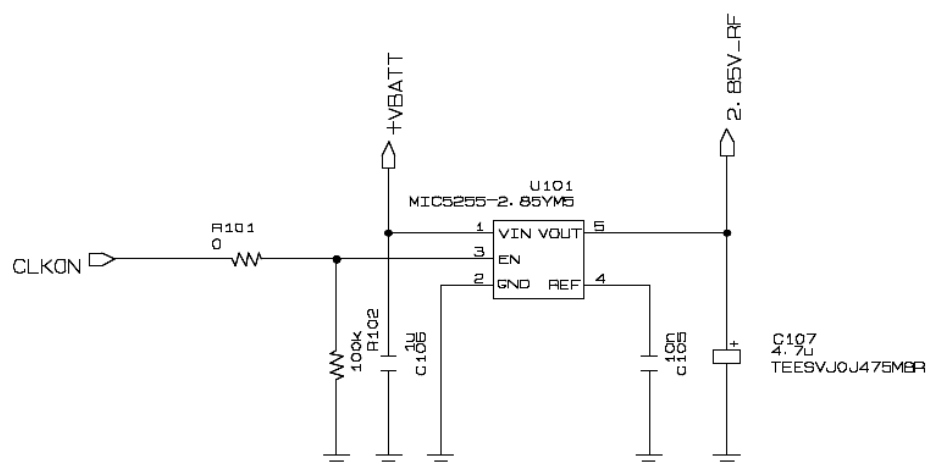


TEST POINT

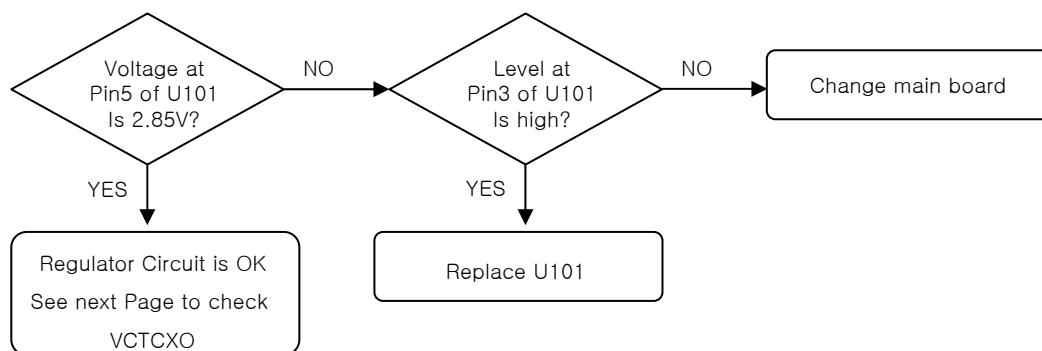


Figure 6

CIRCUIT

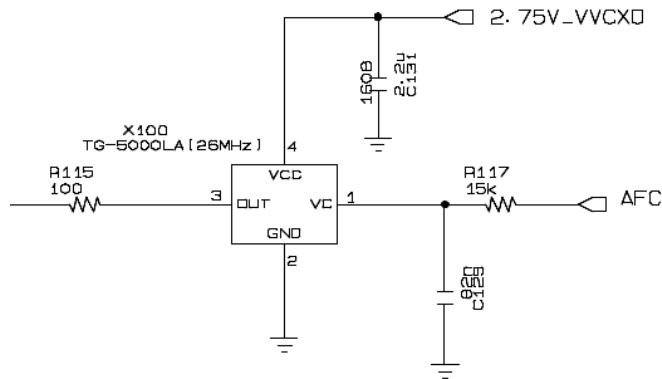
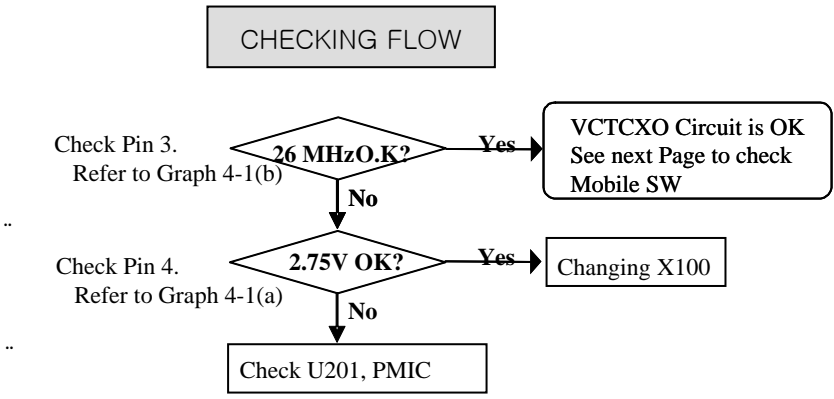
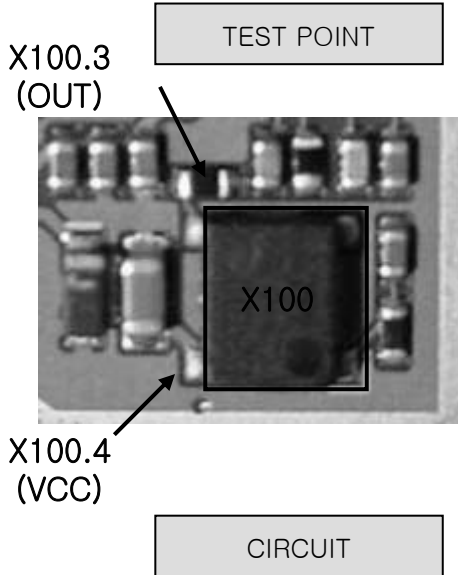


CHECKING FLOW

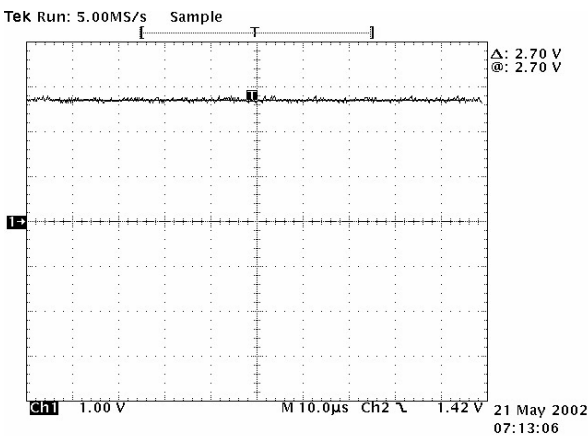


4. TROUBLE SHOOTING

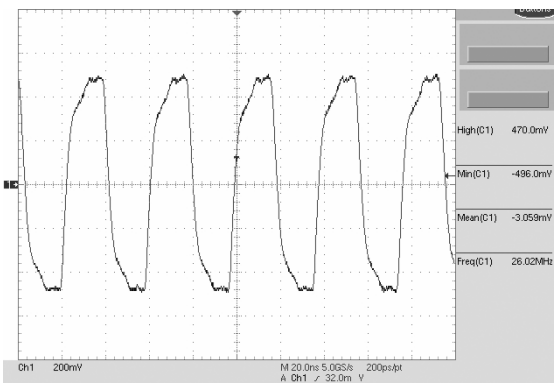
(2) Checking VCTCXO Circuit



WAVEFORM



Graph 1(a)



Graph 1(b)

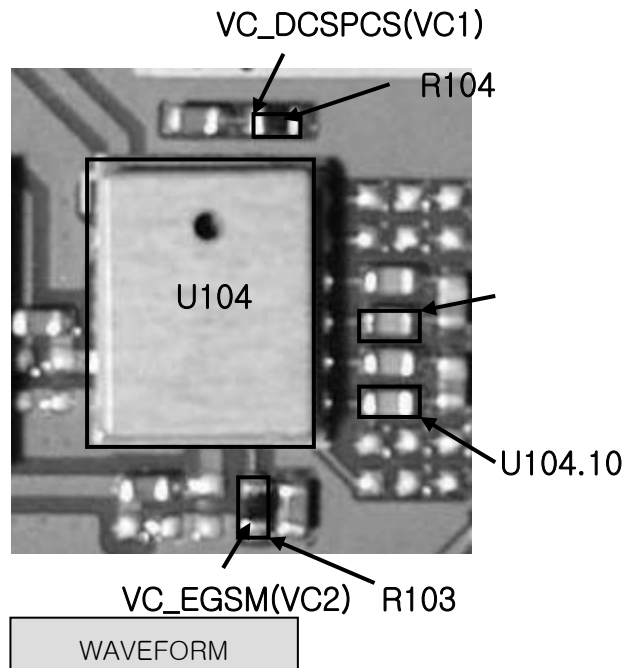
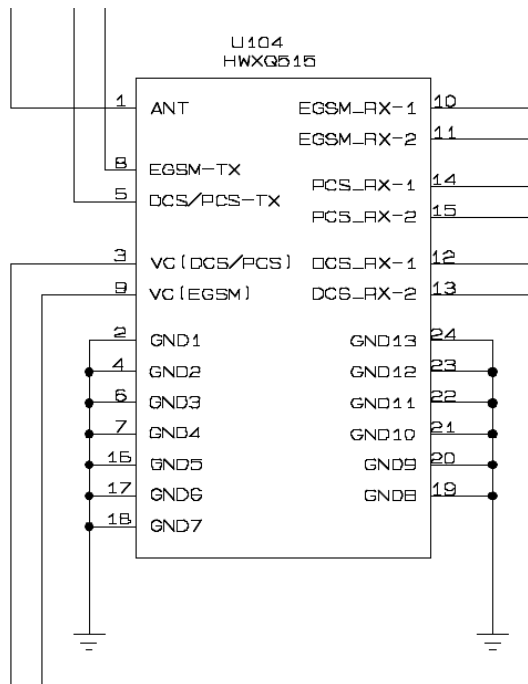
4. TROUBLE SHOOTING

(3) Checking Mobile SW & FEM

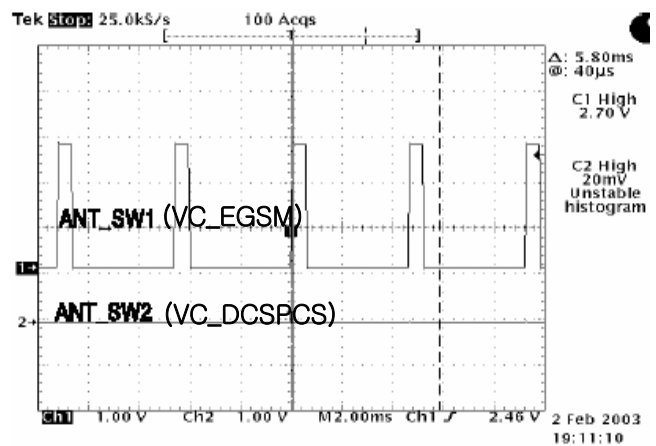
TEST POINT

Figure 8

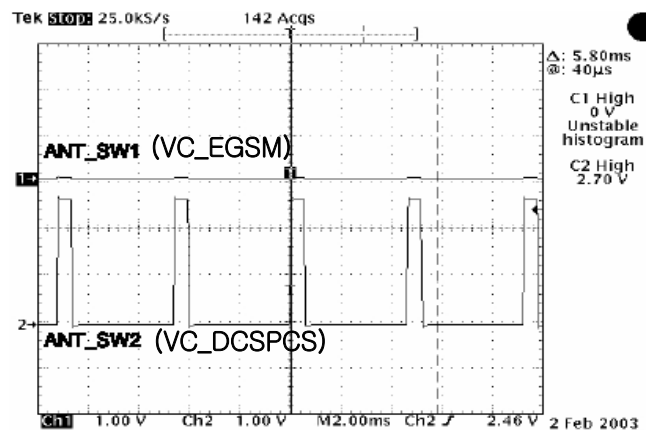
CIRCUIT



WAVEFORM

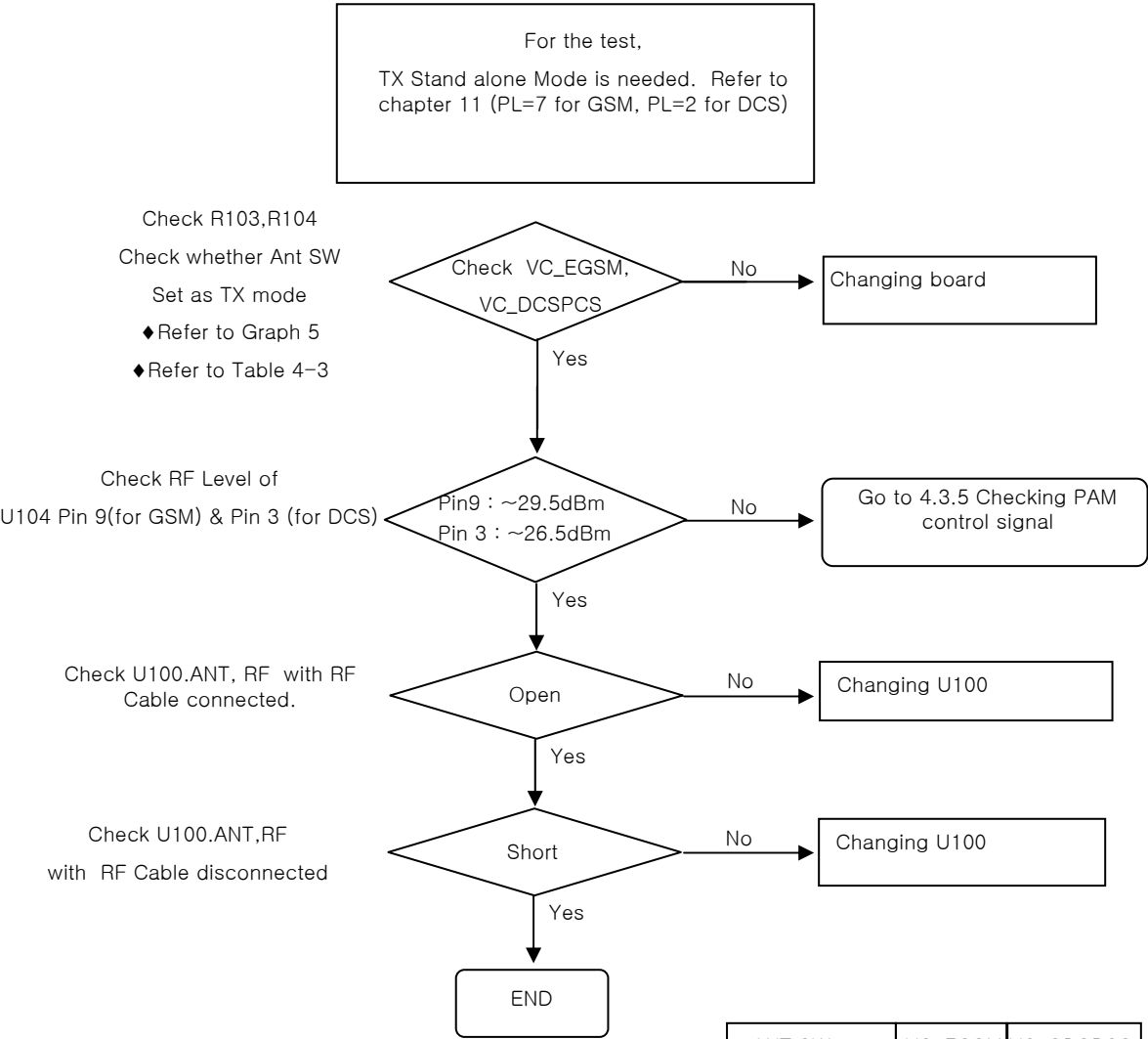


Graph 5(a) GSM Tx mode



Graph 5(b) DCS,PCS Tx mode

CHECKING FLOW

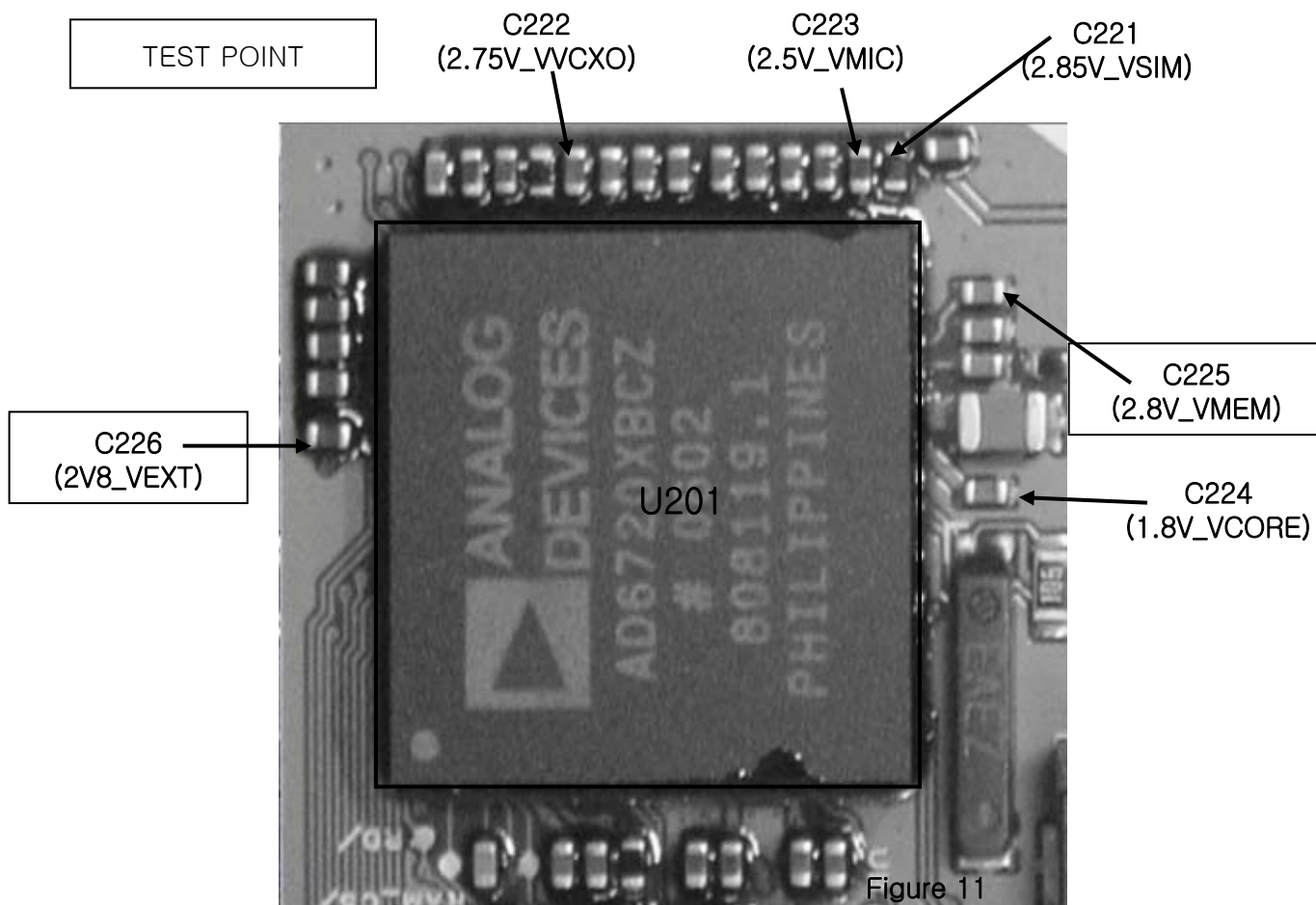


| ANT SW | VC_EGSM | VC_CDSPCS |
|--------------|---------|-----------|
| DCS TX | 0 | 1 |
| EGSM TX | 1 | 0 |
| EGSM, DCS RX | 0 | 0 |

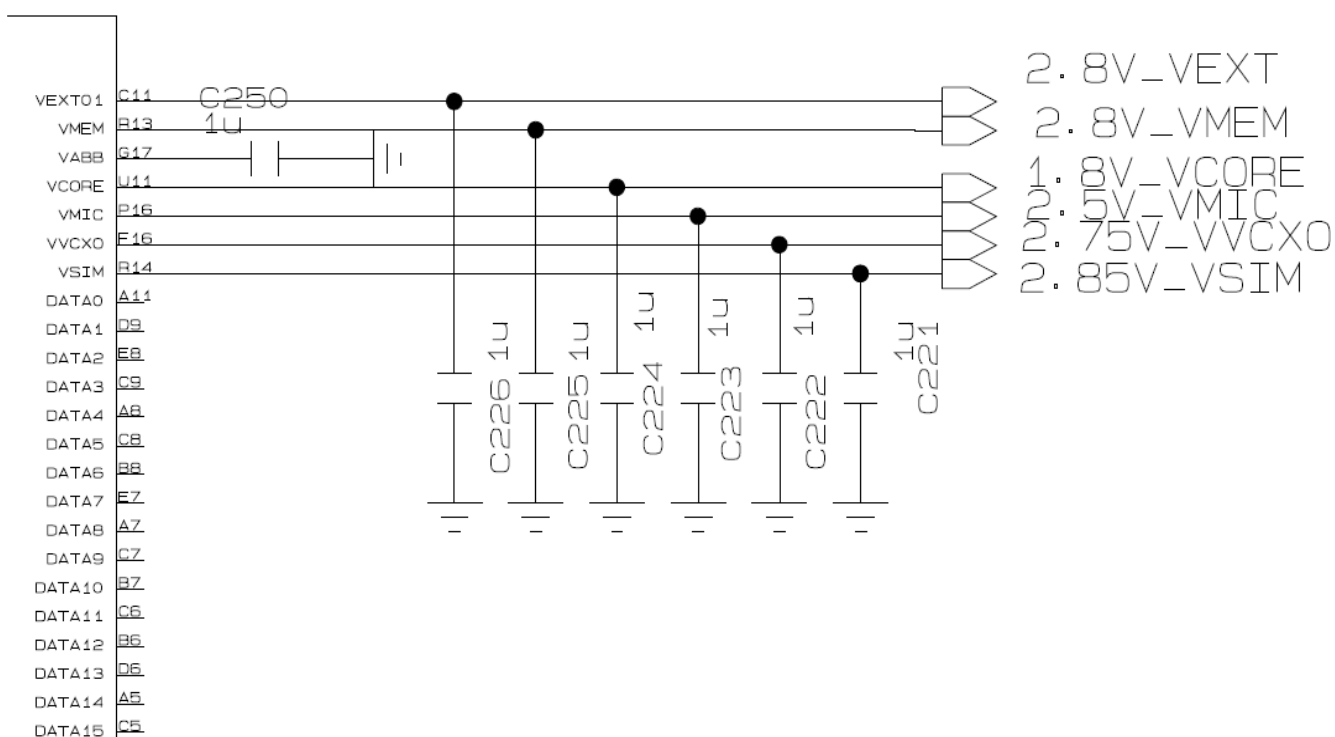
Table 4-3

4. TROUBLE SHOOTING

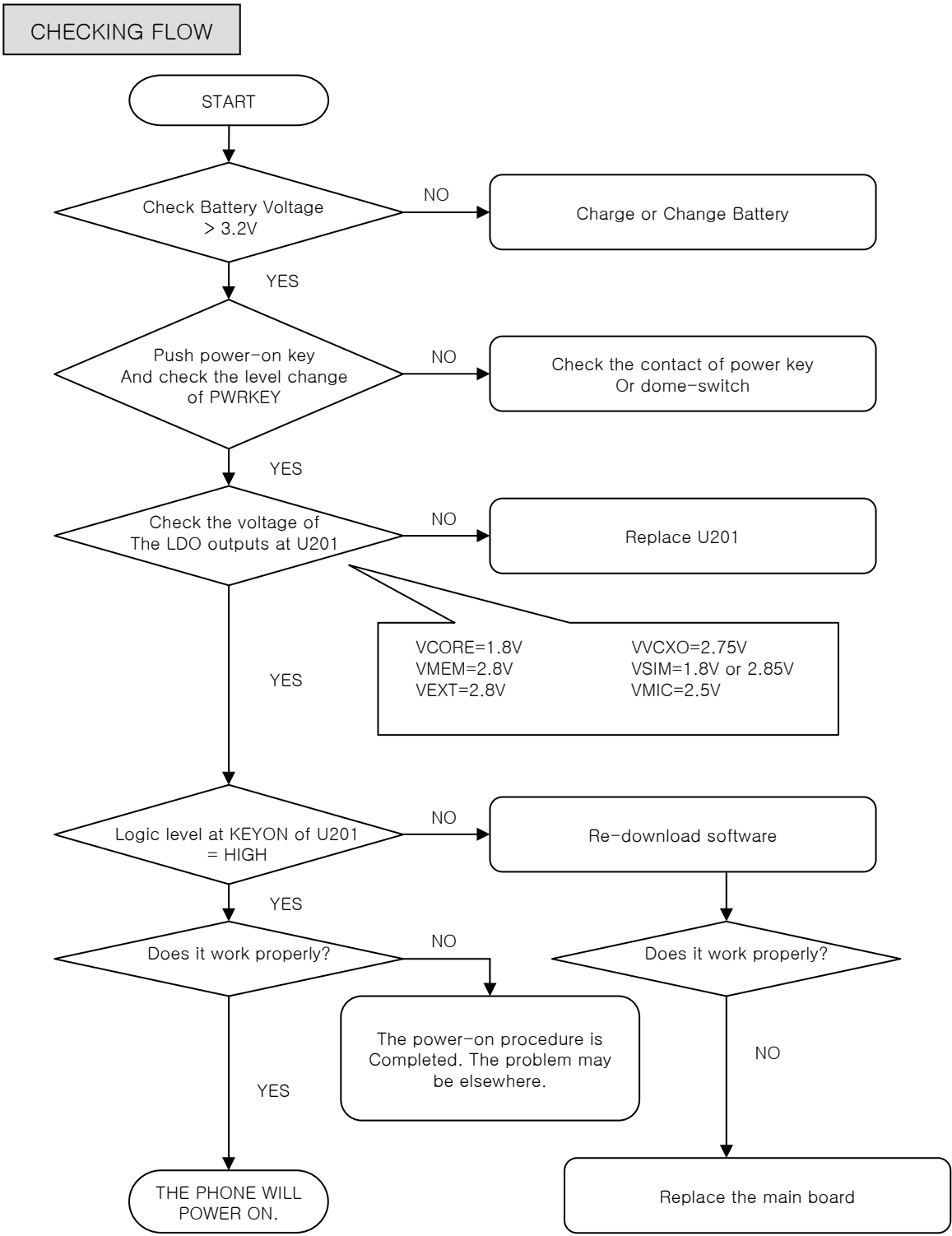
4.4 Power On Trouble



CIRCUIT



4. TROUBLE SHOOTING



TEST POINT

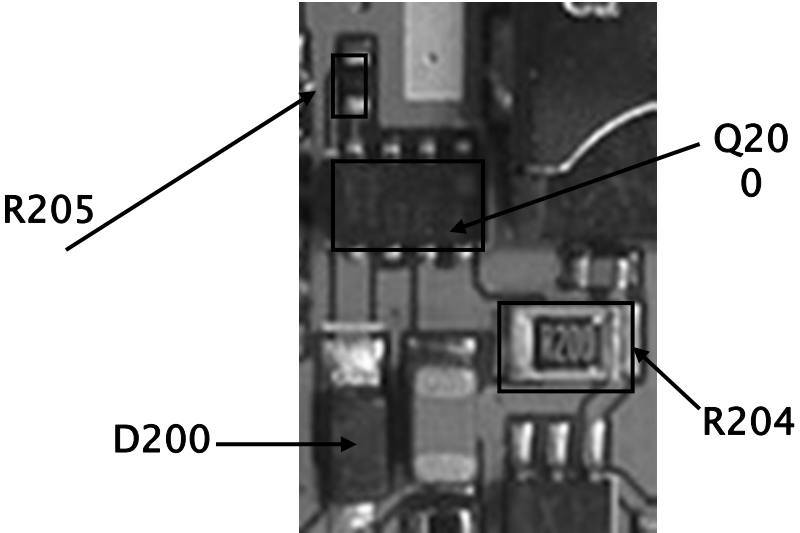
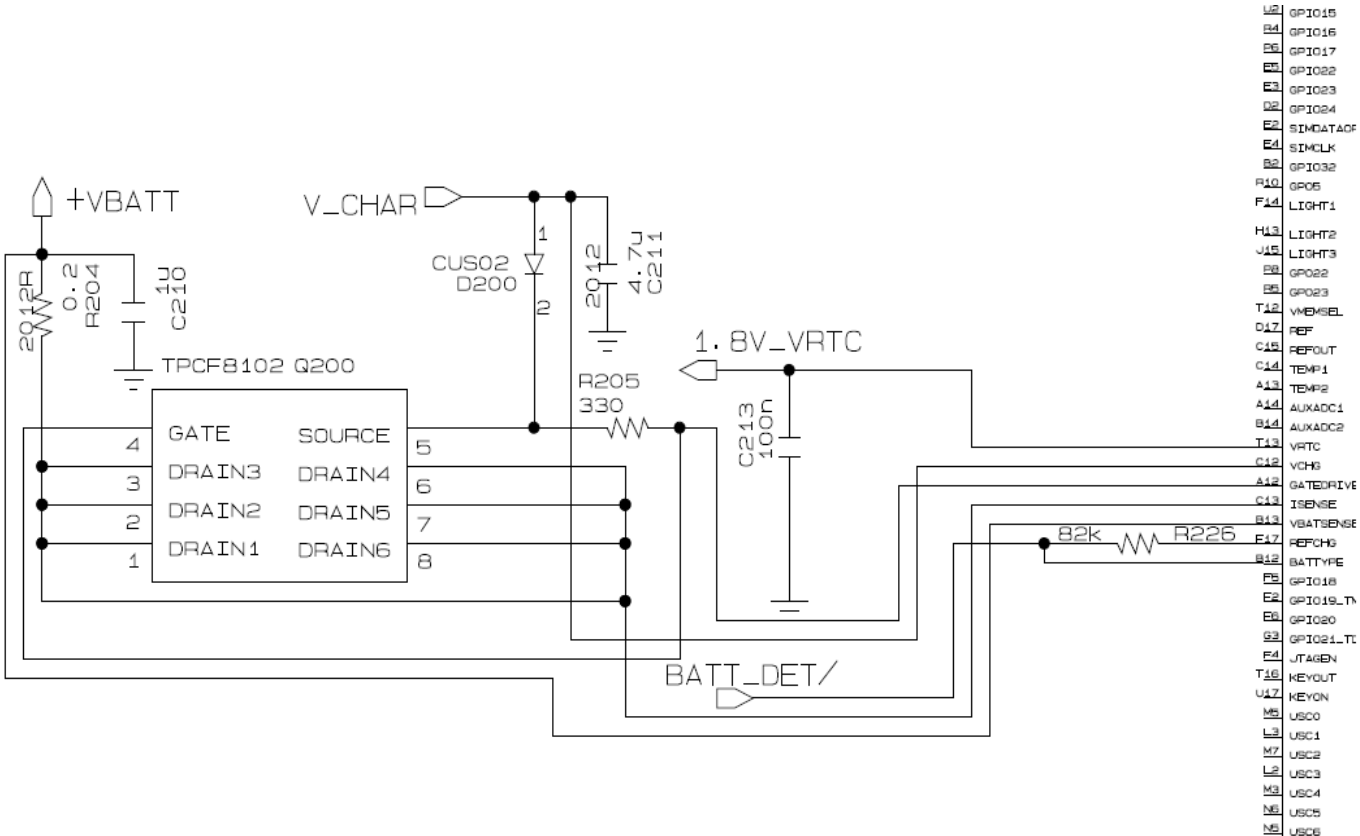


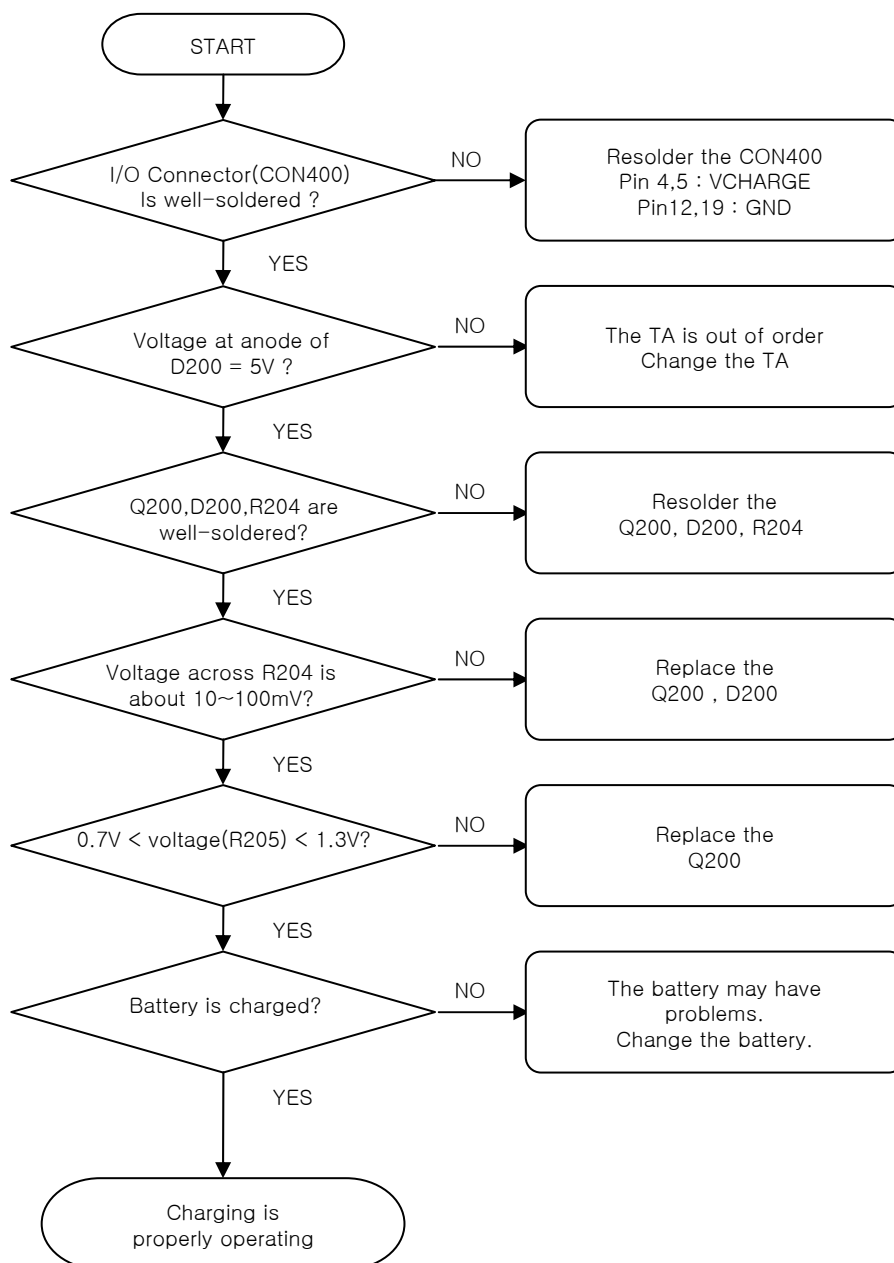
Figure 12

CIRCUIT



4. TROUBLE SHOOTING

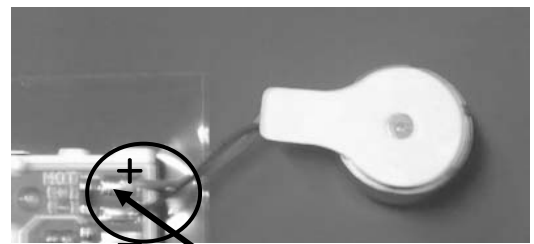
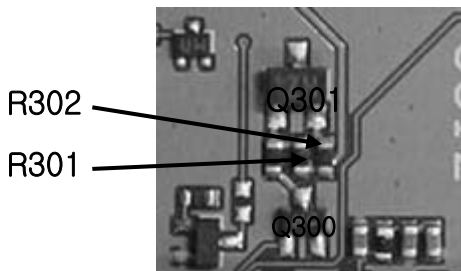
CHECKING FLOW



4. TROUBLE SHOOTING

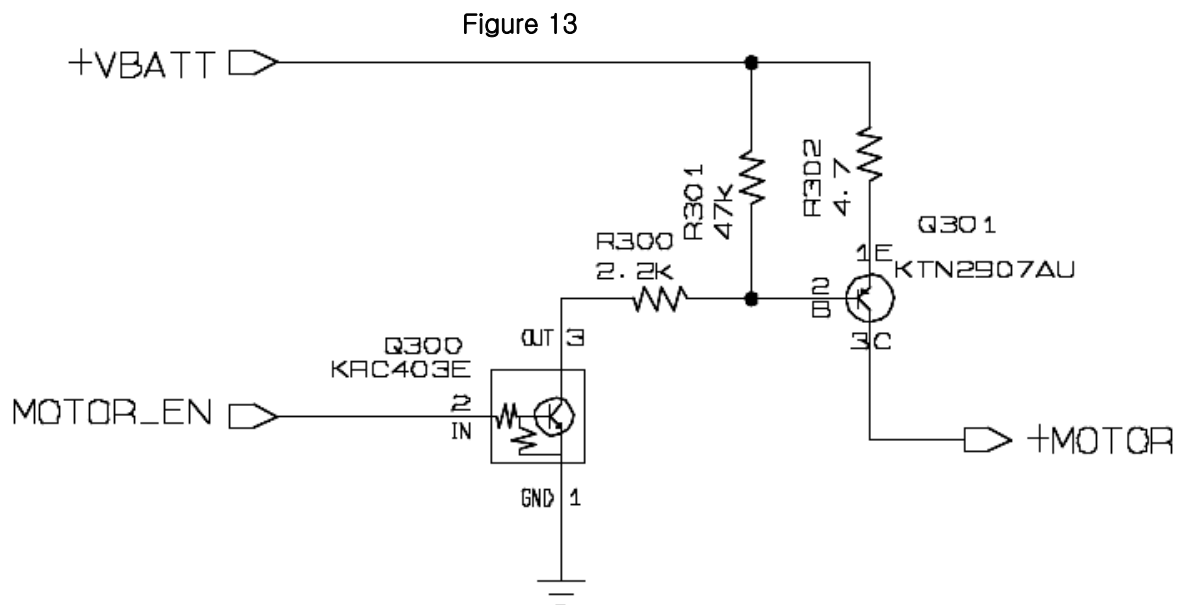
4.6 Vibrator Trouble

TEST POINT



Soldering Check in LCD Module

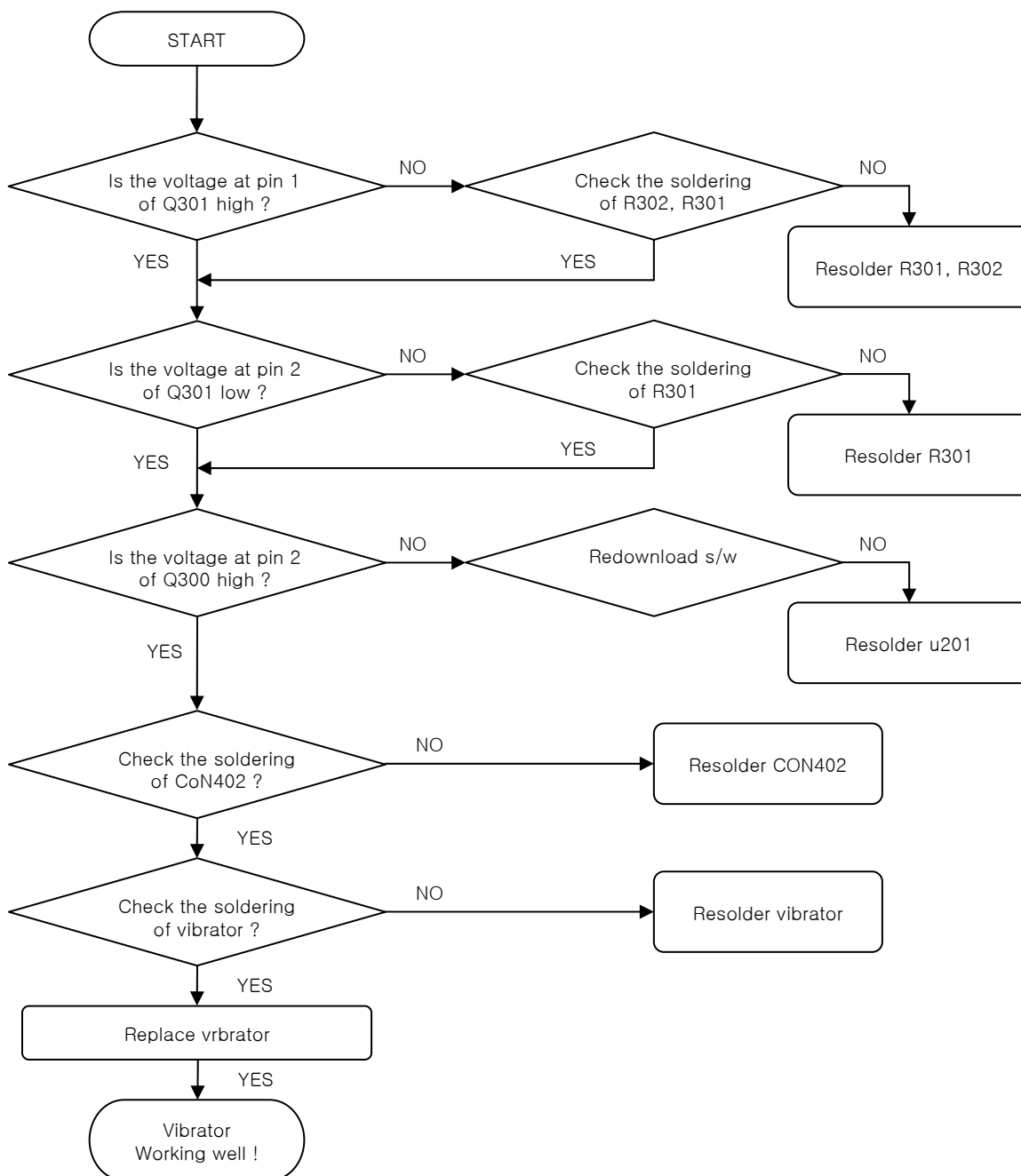
CIRCUIT



4. TROUBLE SHOOTING

CHECKING FLOW

SETTING : Enter the engineering mode, and set vibrator on at vibration of BB test menu



4. TROUBLE SHOOTING

4.7 LCD Trouble

TEST POINT

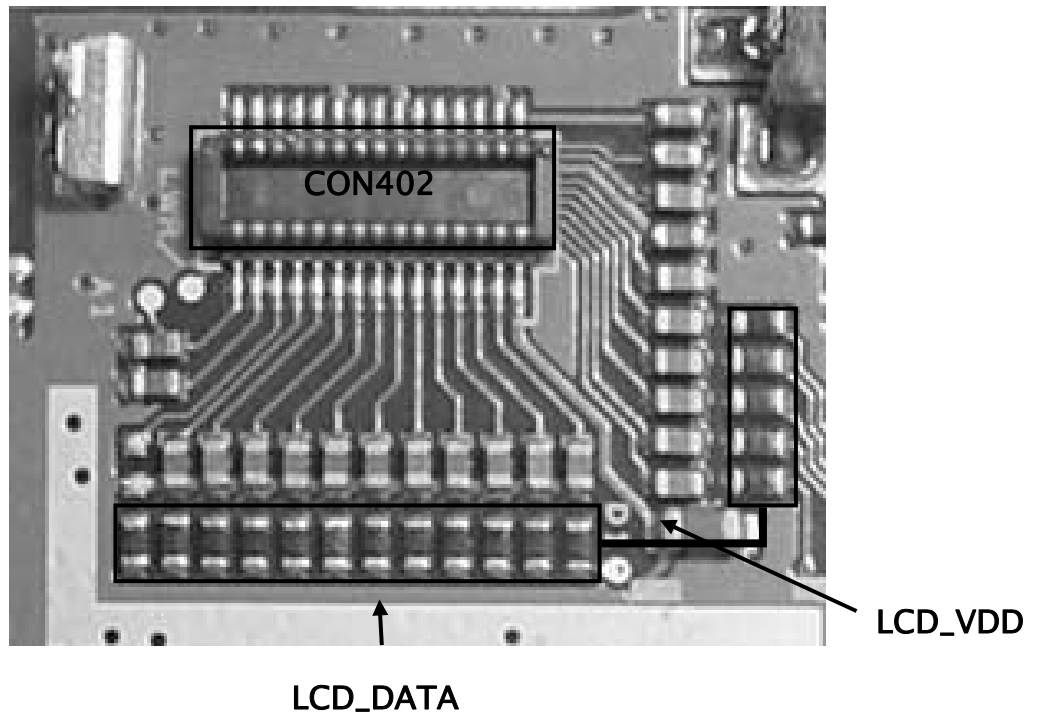


Figure 14

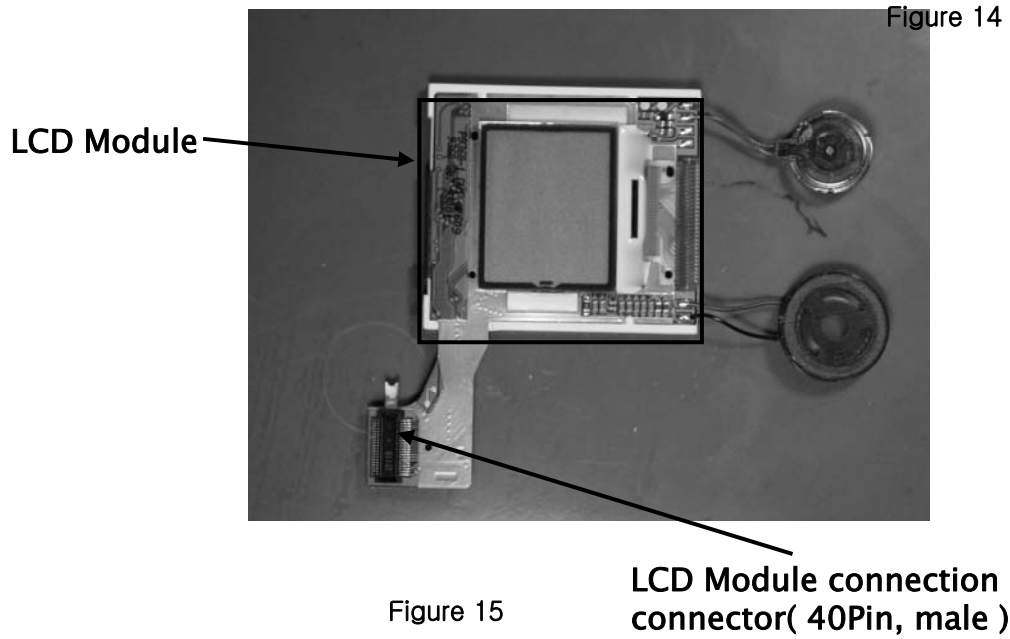
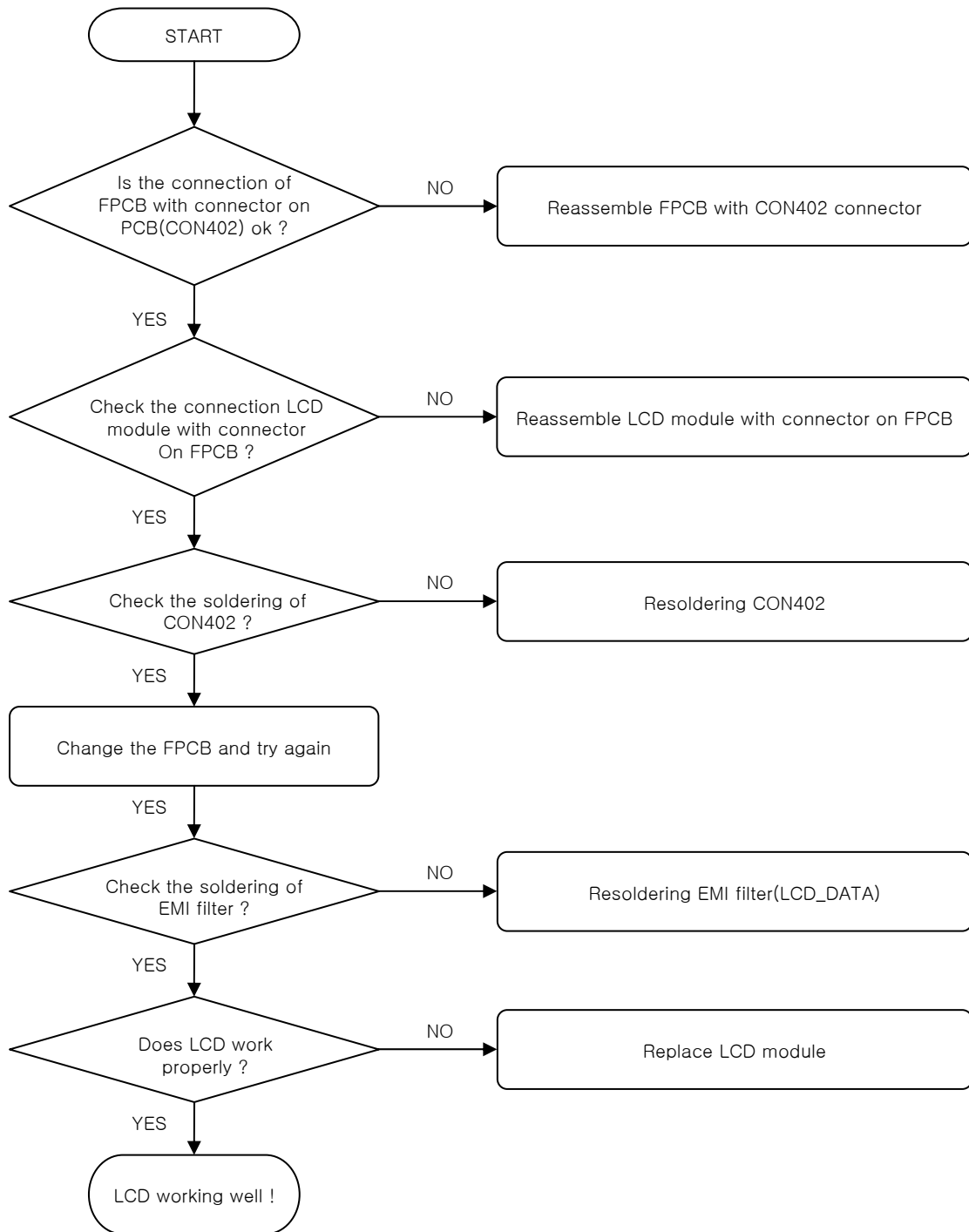


Figure 15

4. TROUBLE SHOOTING

CHECKING FLOW



4. TROUBLE SHOOTING

4.8 Speaker Trouble

TEST POINT

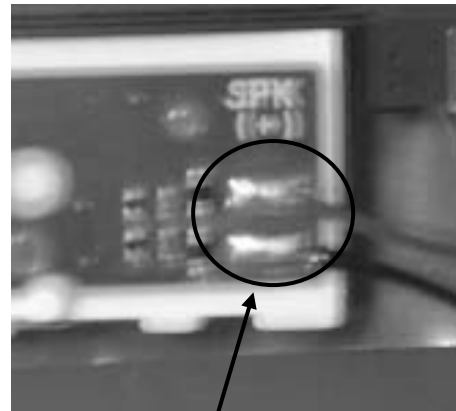
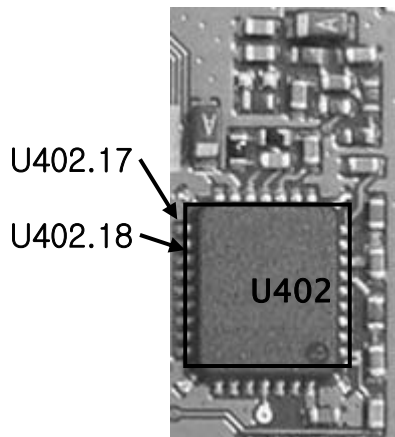
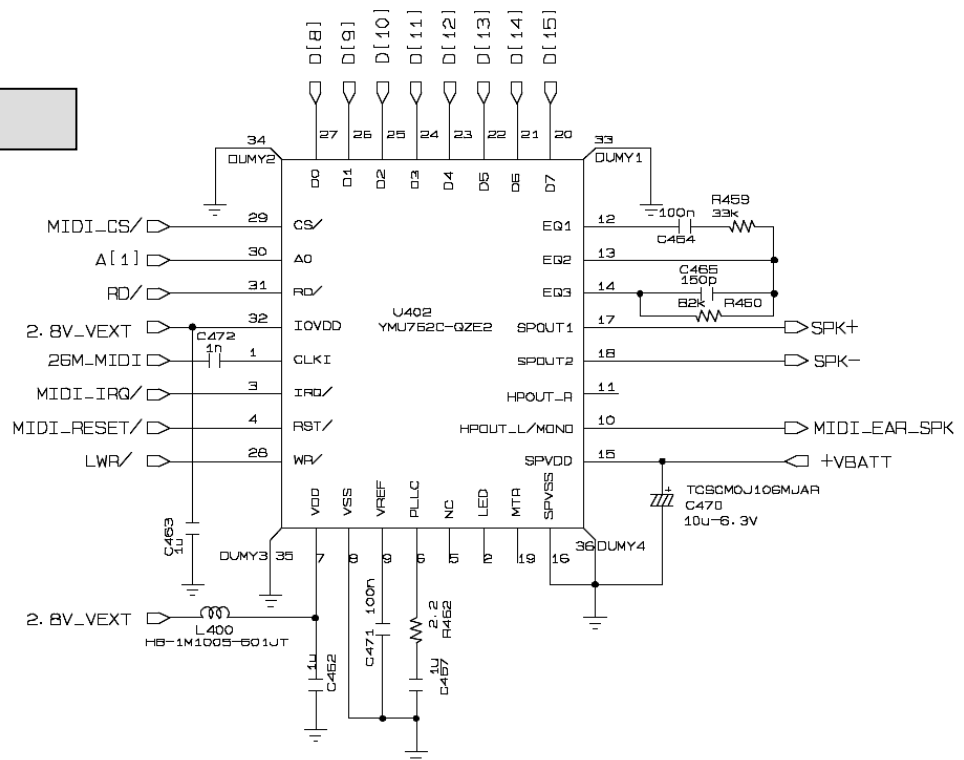


Figure 18

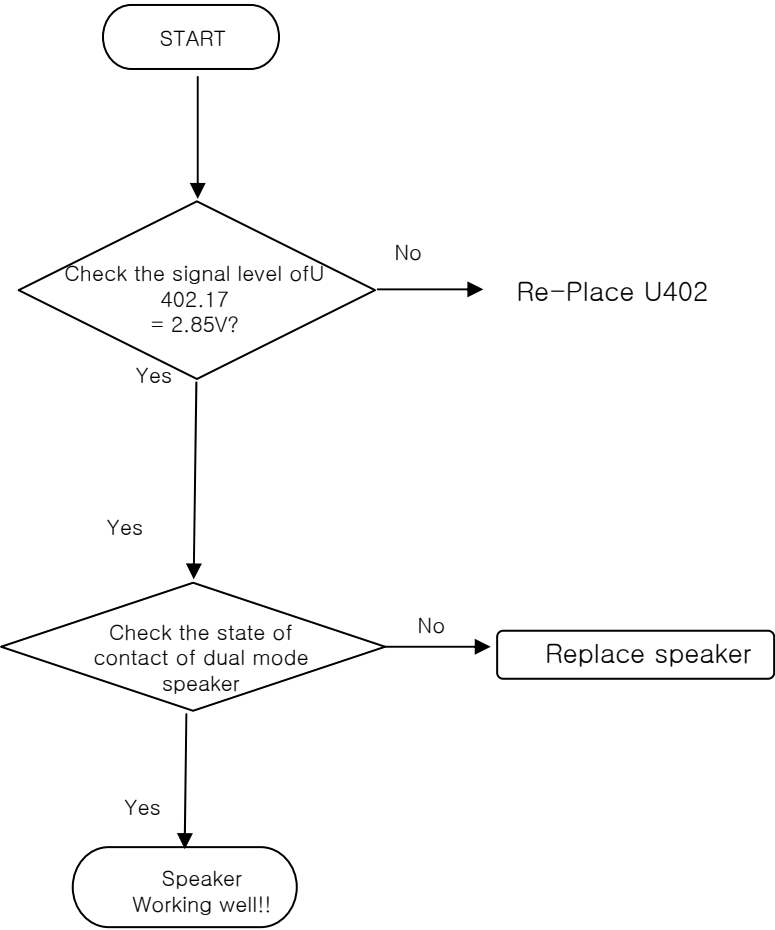
Soldering Check

CIRCUIT



4. TROUBLE SHOOTING

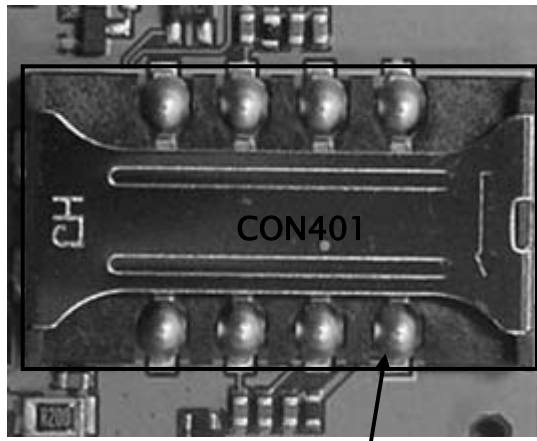
CHECKING FLOW



4. TROUBLE SHOOTING

4.9 SIM Card Interface Trouble

TEST POINT

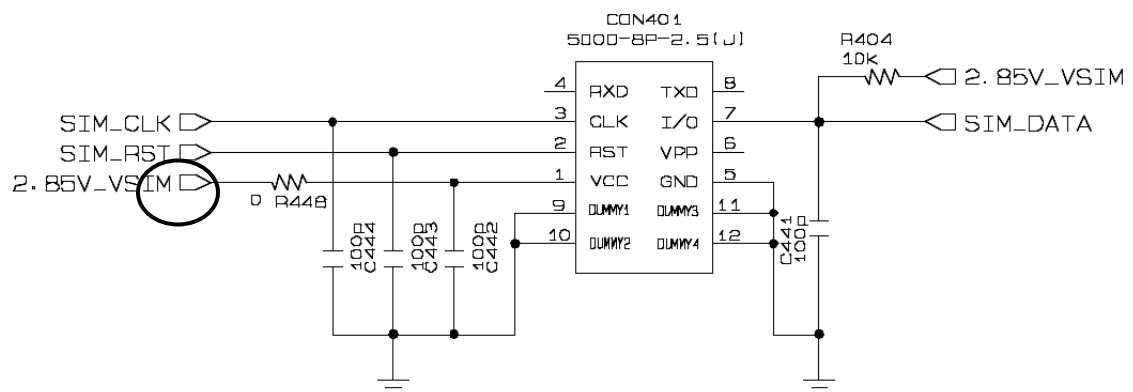


CON401.1
(C442,R448)

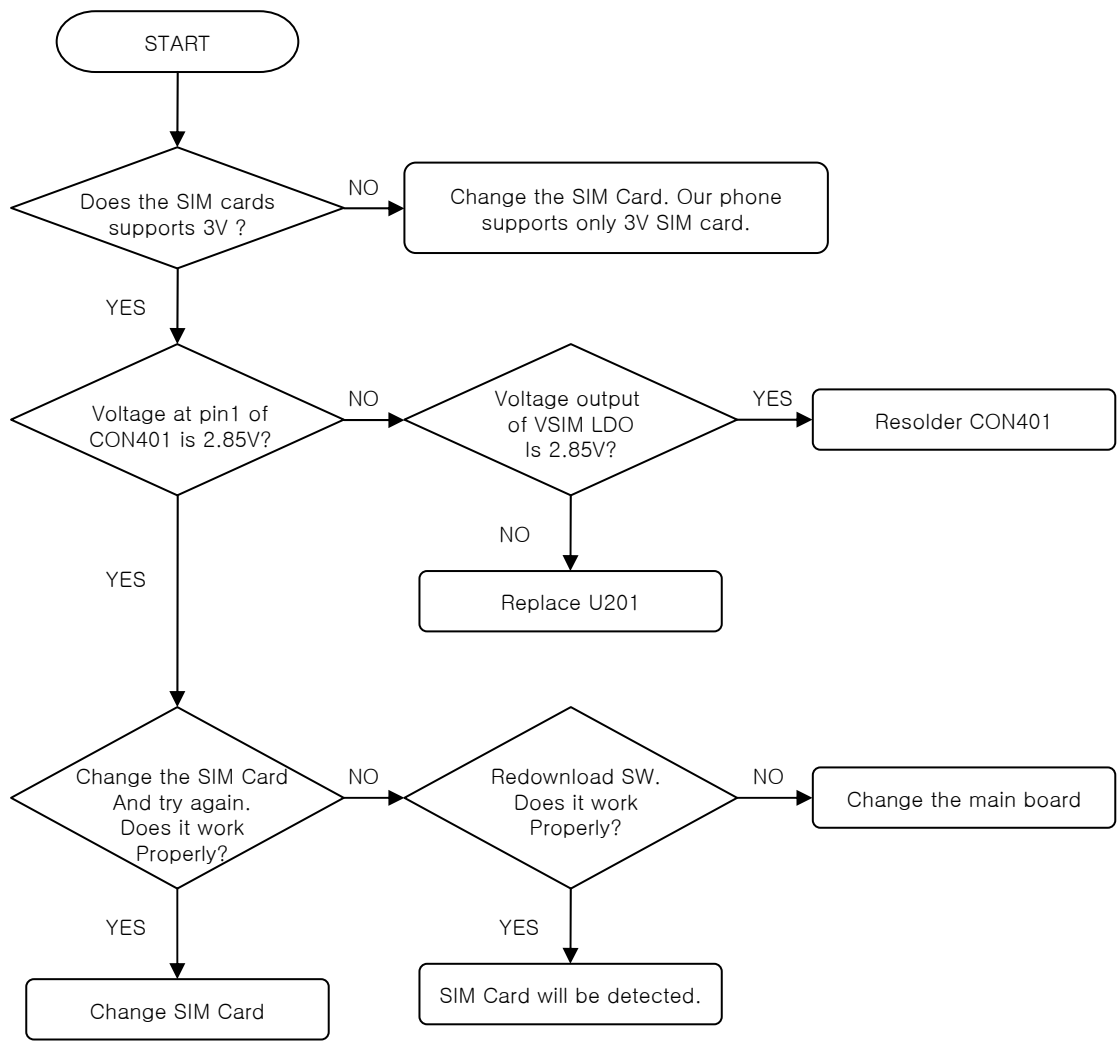
Figure 19

CIRCUIT

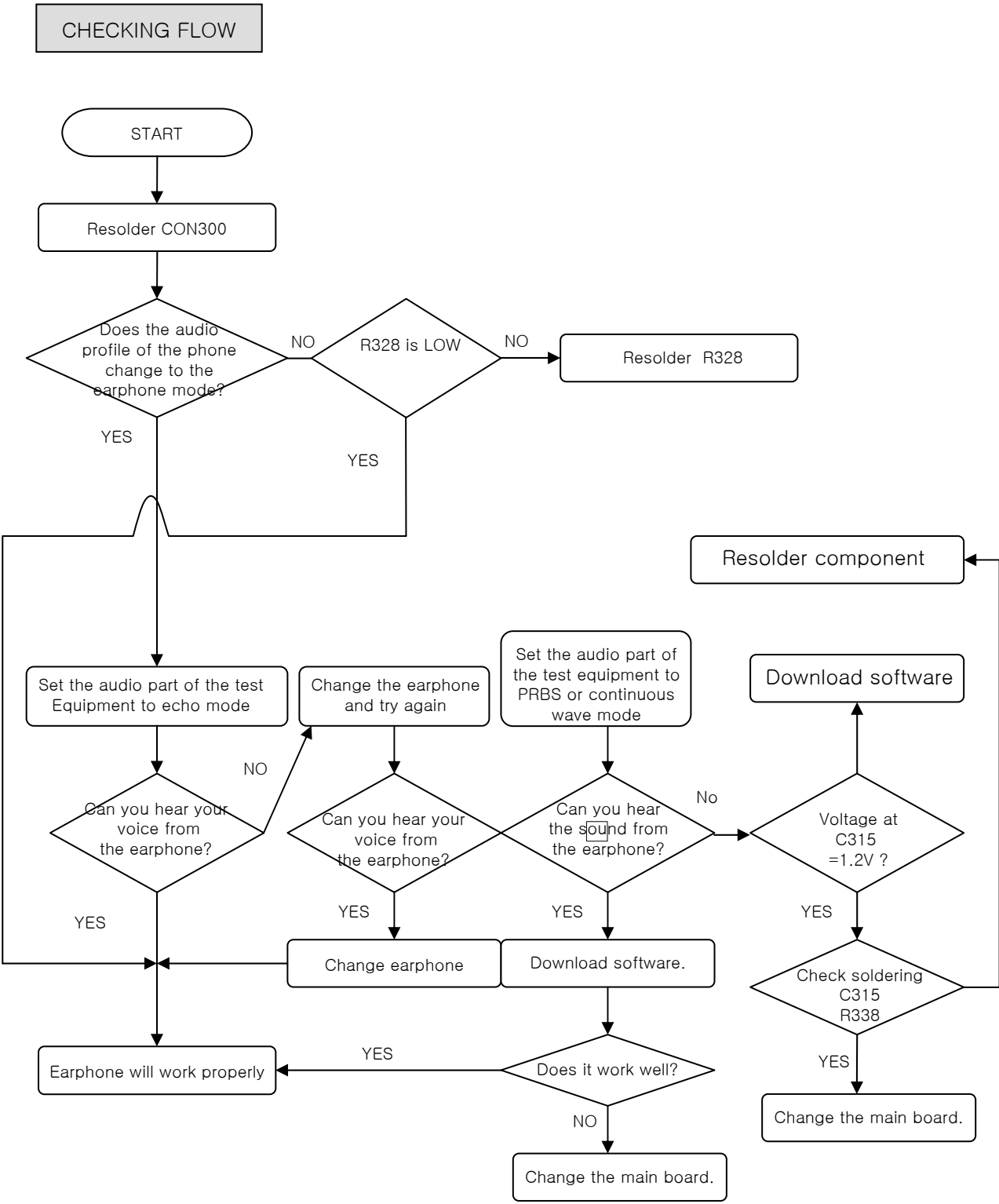
< SIM SOCKET >



CHECKING FLOW



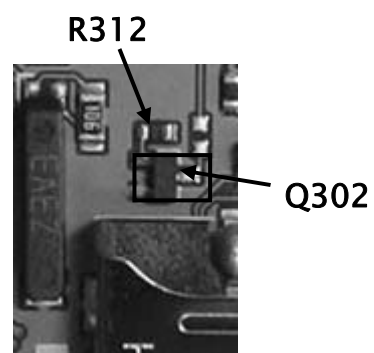
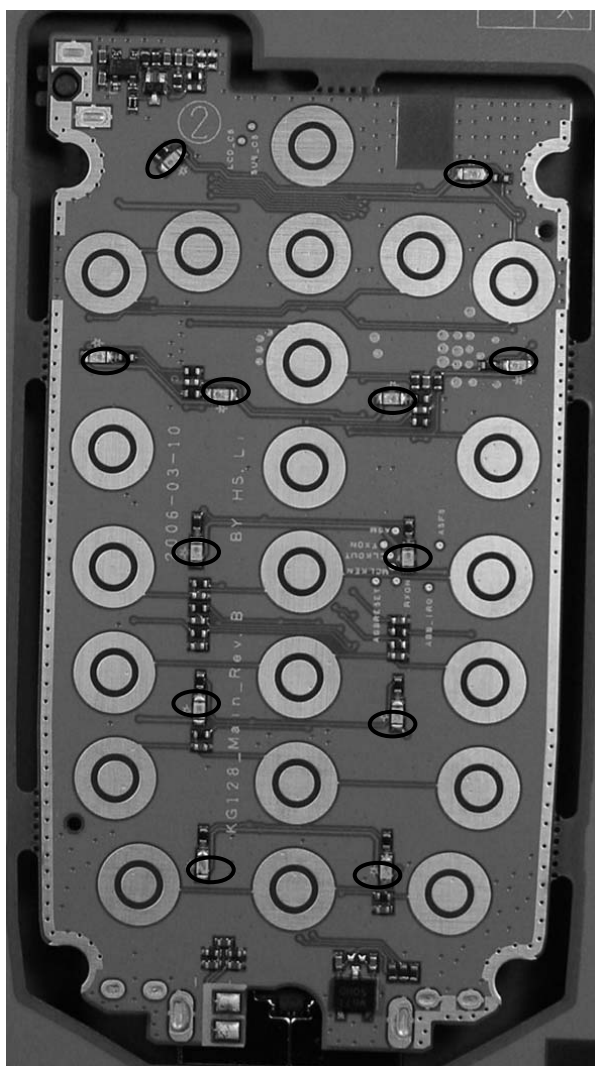
4. TROUBLE SHOOTING



4. TROUBLE SHOOTING

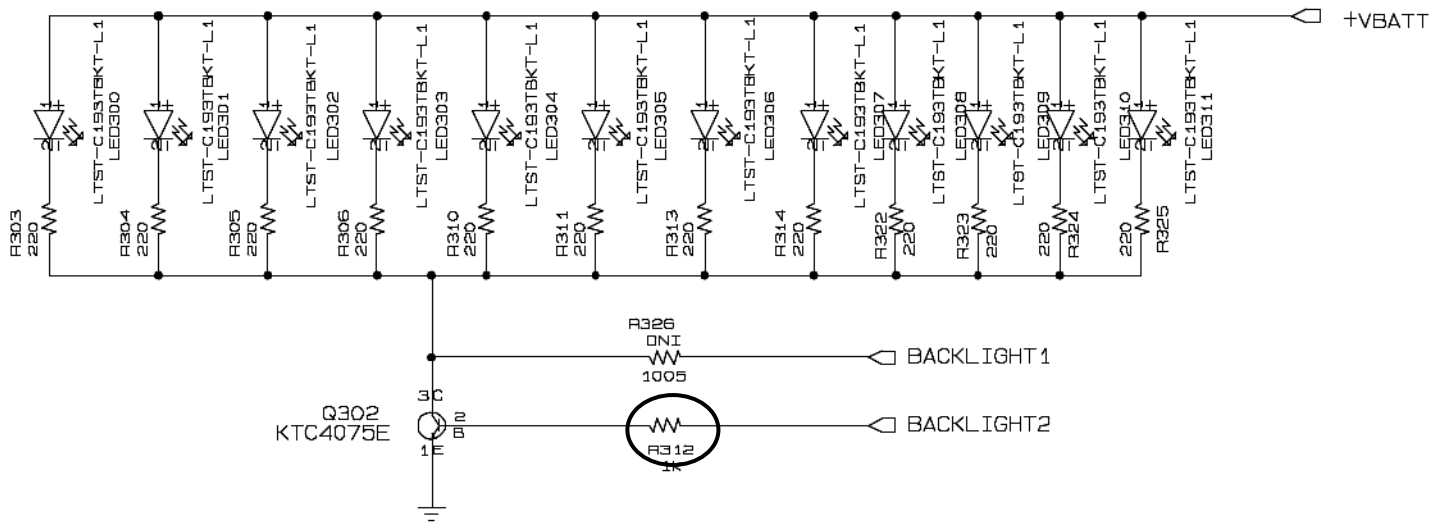
4.11 KEY backlight Trouble

TEST POINT

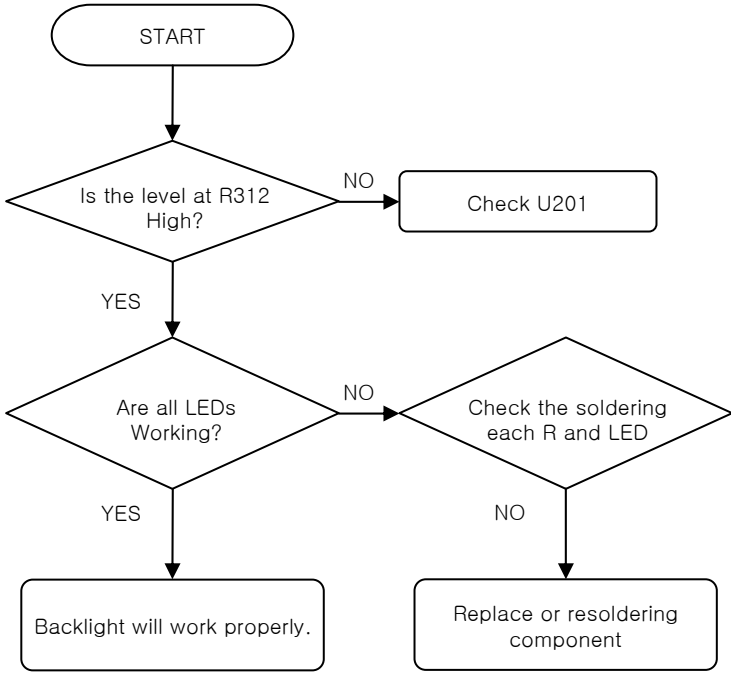


4. TROUBLE SHOOTING

CIRCUIT



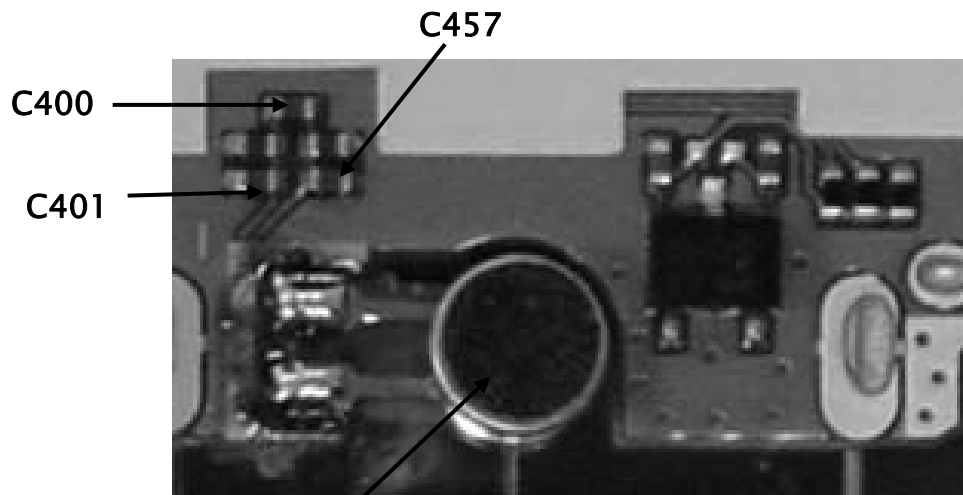
CHECKING FLOW



4. TROUBLE SHOOTING

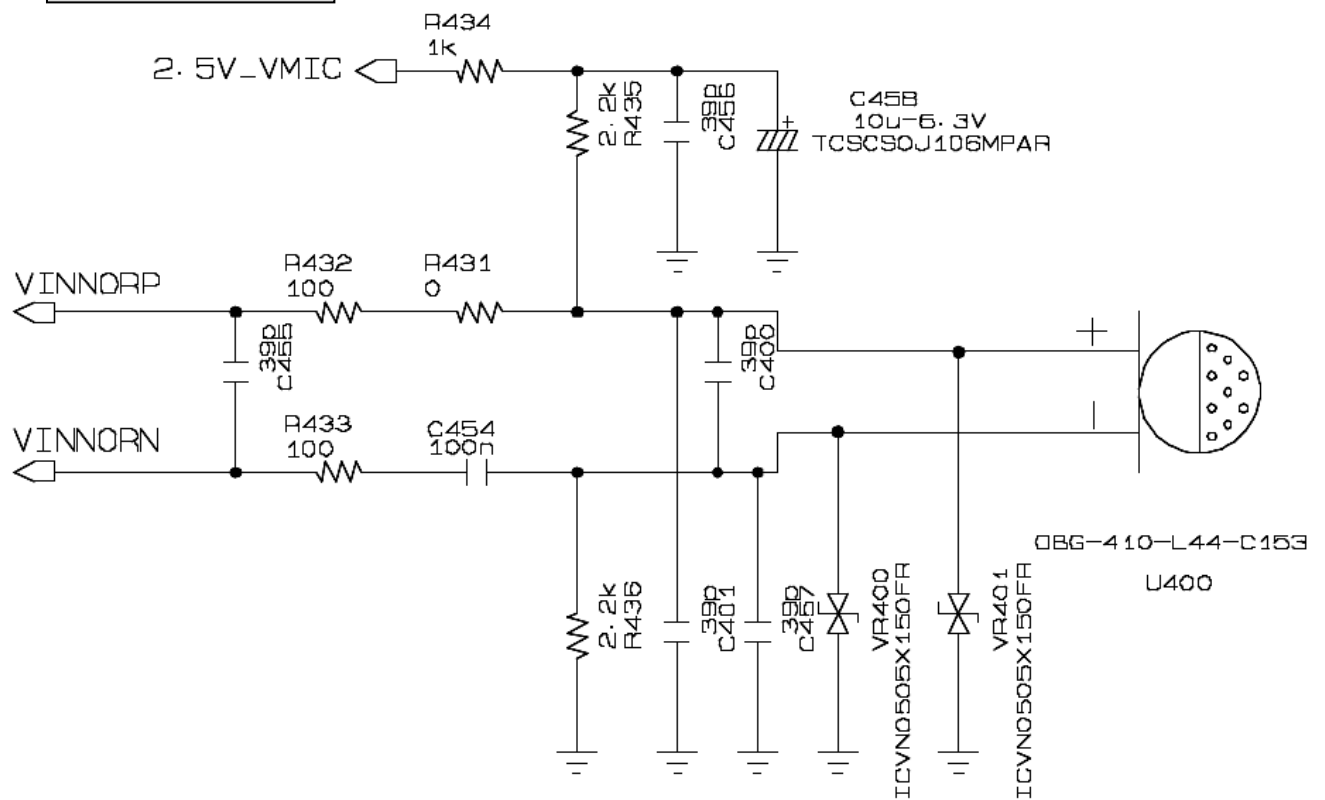
4.12 Microphone Trouble

TEST POINT



U400

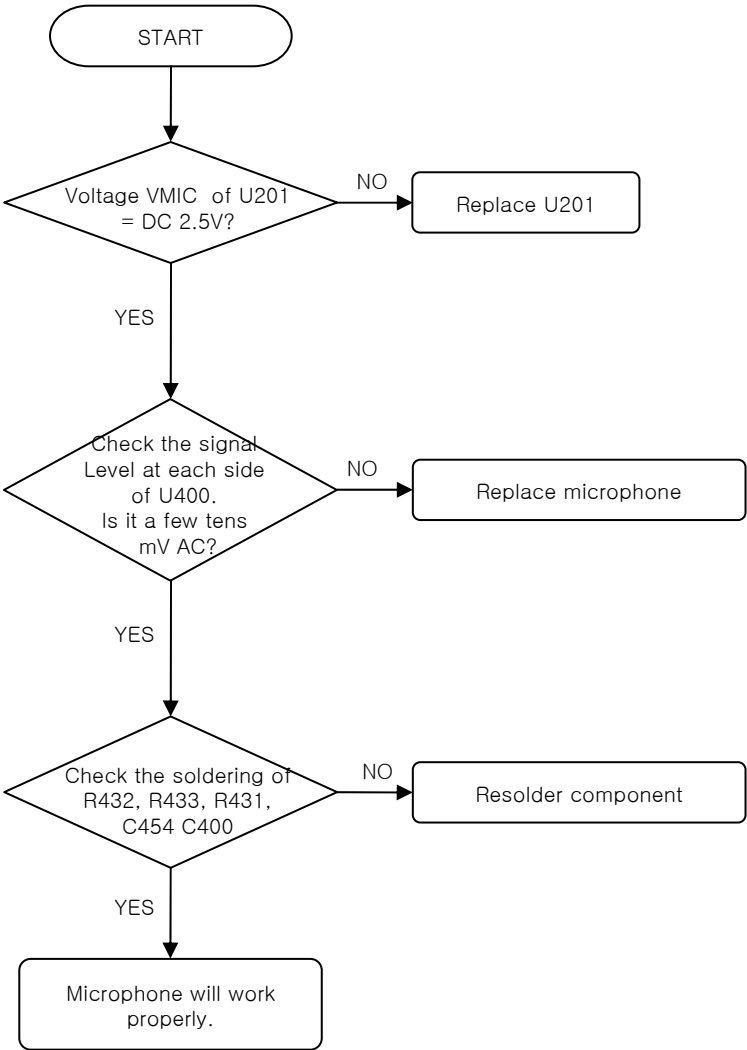
CIRCUIT



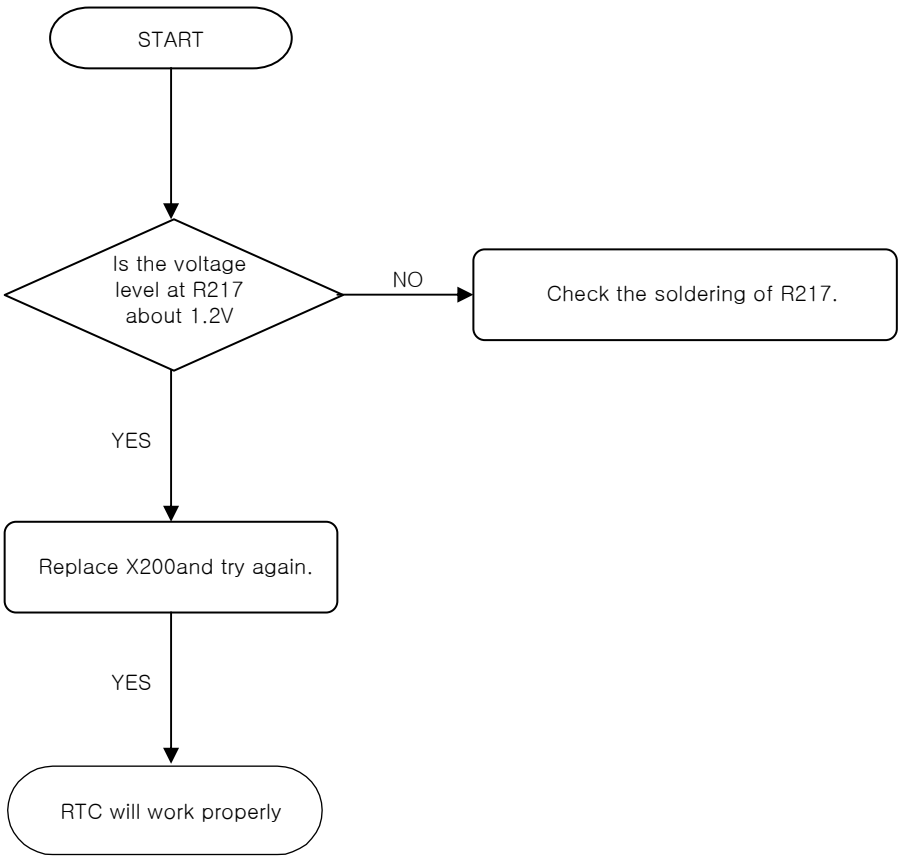
4. TROUBLE SHOOTING

CHECKING FLOW

SETTING : After initialize Agilent 8960, Test EGSM, DCS mode



CHECKING FLOW



4. TROUBLE SHOOTING

4.14 Folder on/off Trouble

TEST POINT

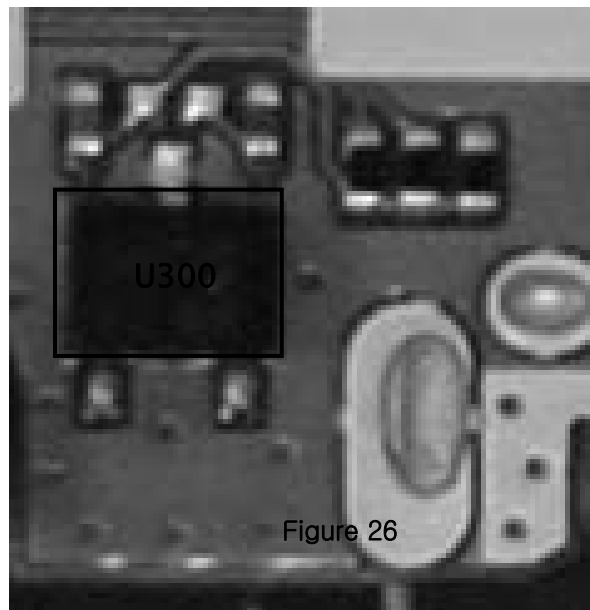
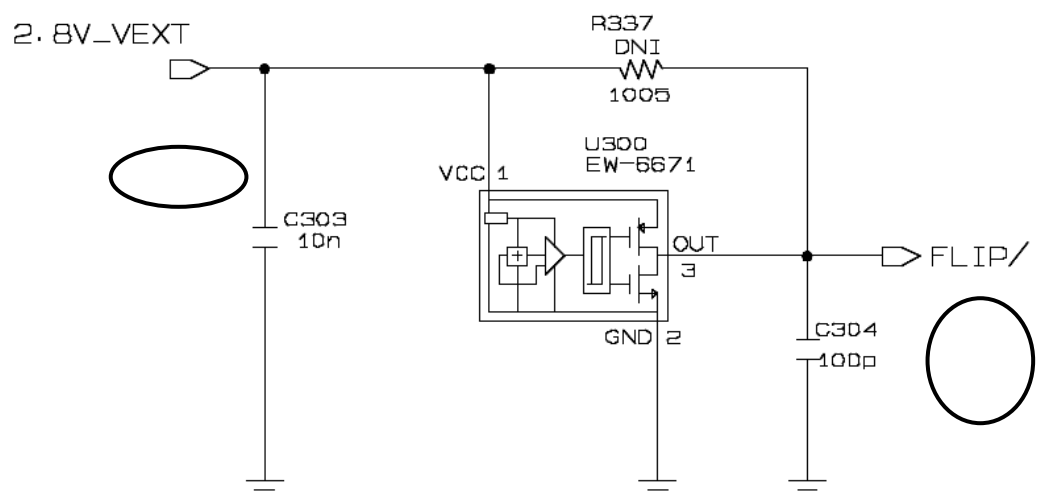


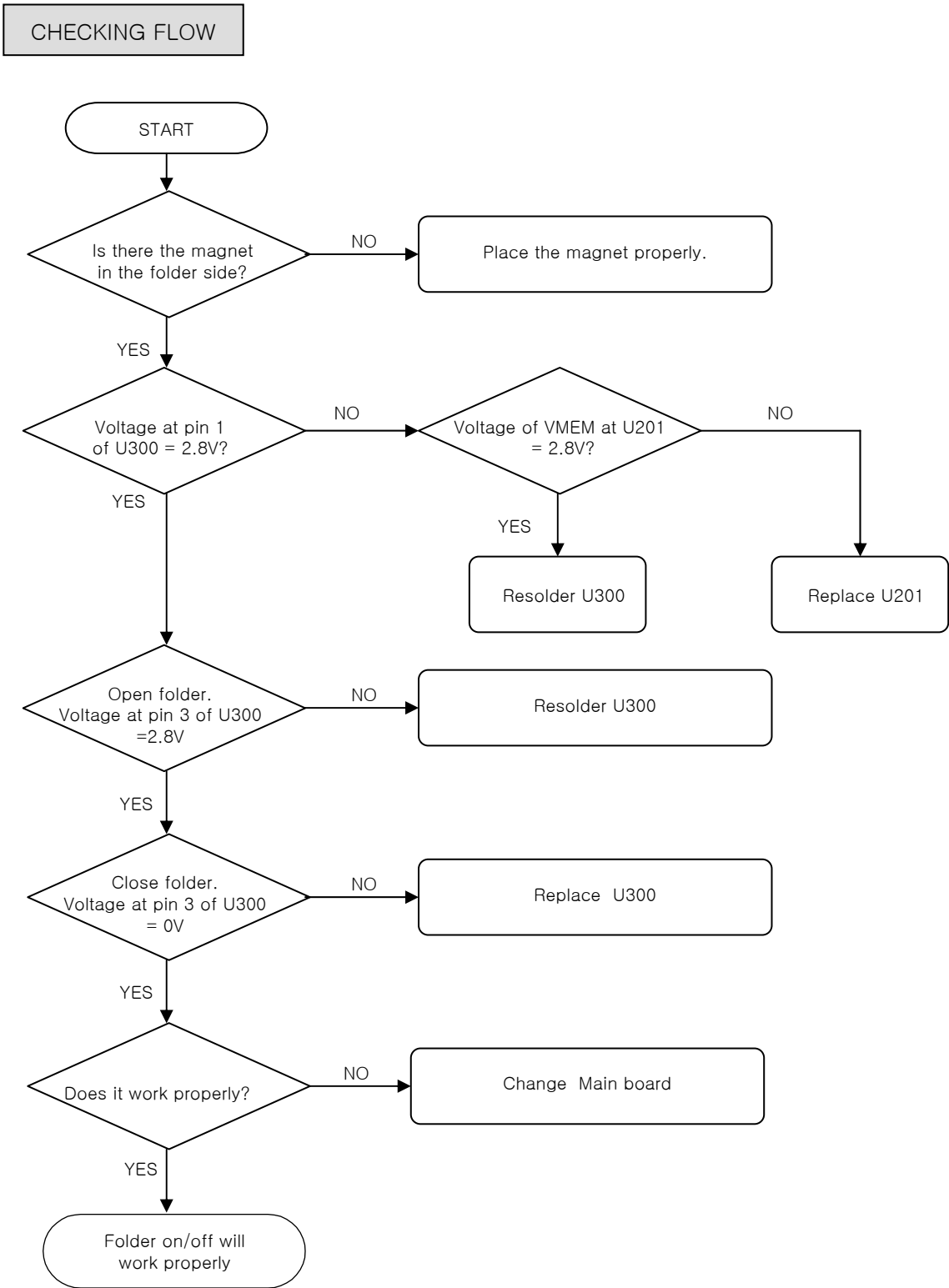
Figure 26

CIRCUIT

<FLIP S/W>

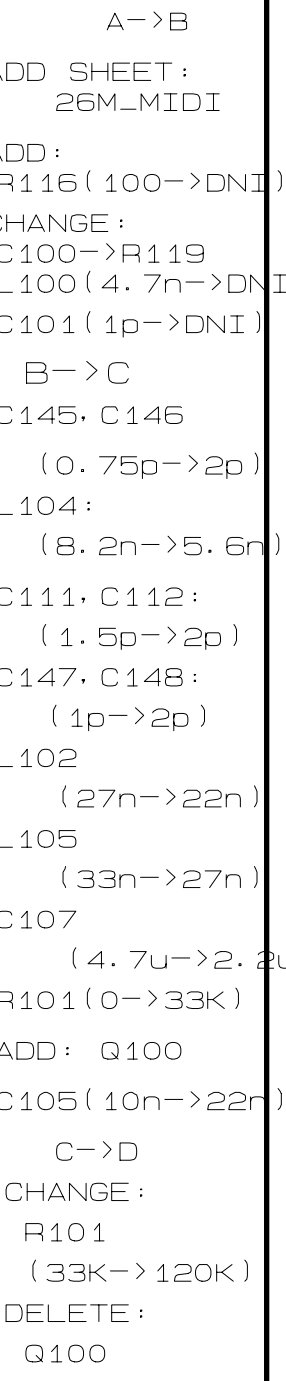


4. TROUBLE SHOOTING

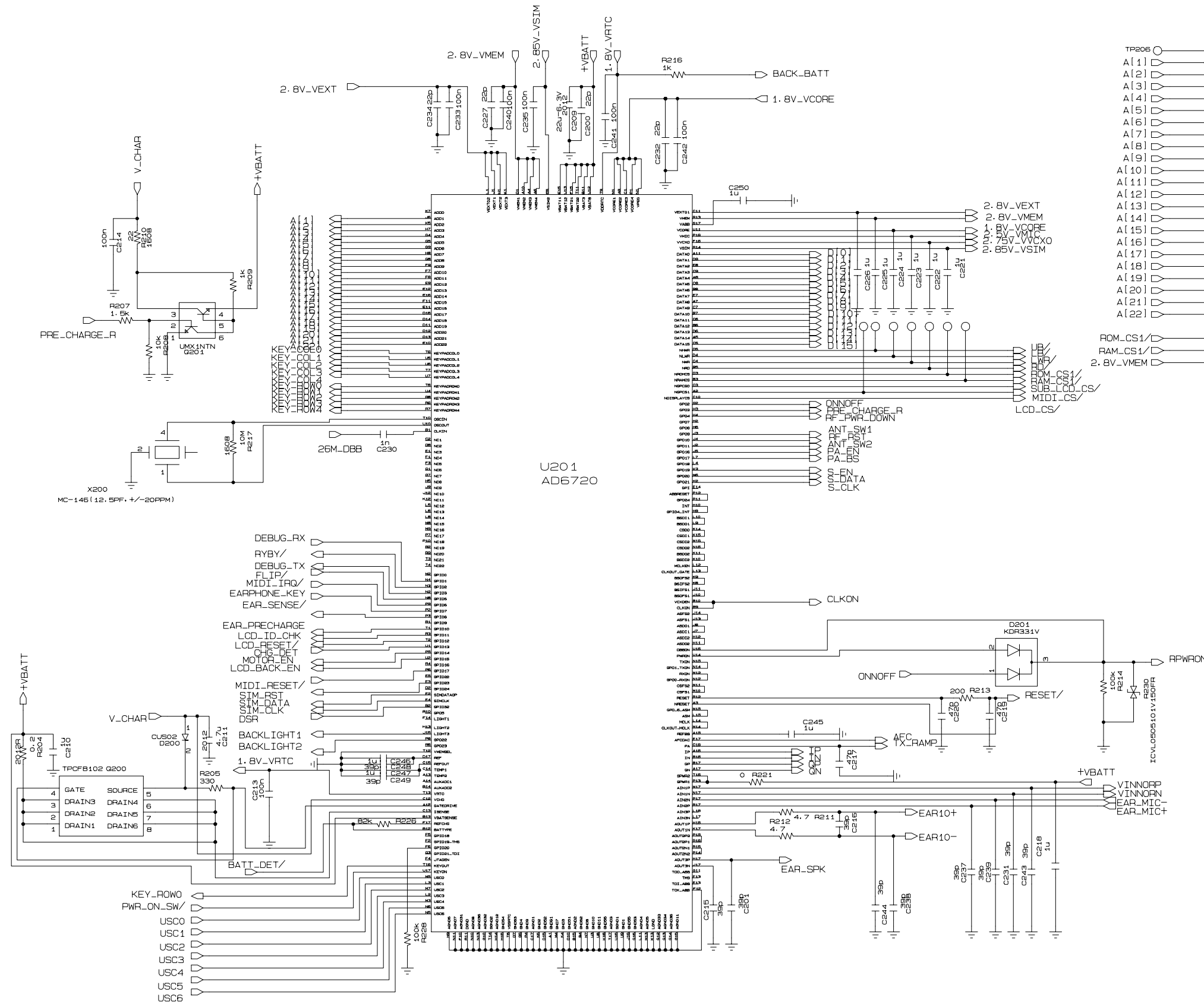


Part 5

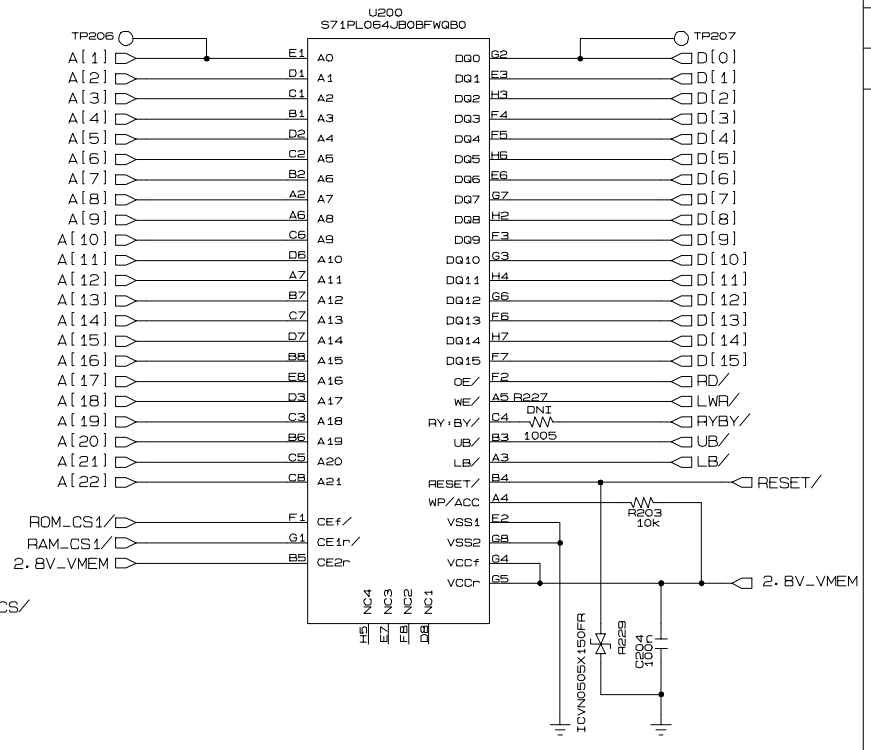
Circuit and PCB Layout (P71–P76)



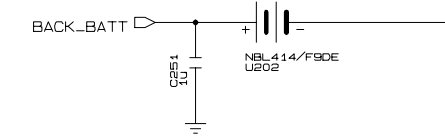
<AD6720>



<MEMORY>



<BACK BATT>



A->B

DELETE SHEET :

SPK_P SPK_N

DELETE :

R224 R202

R200

C202 : C203

C205 : C206

C207 :

CHANGE :

C204

(10u->100n)

C208->R229

ADD :

R228

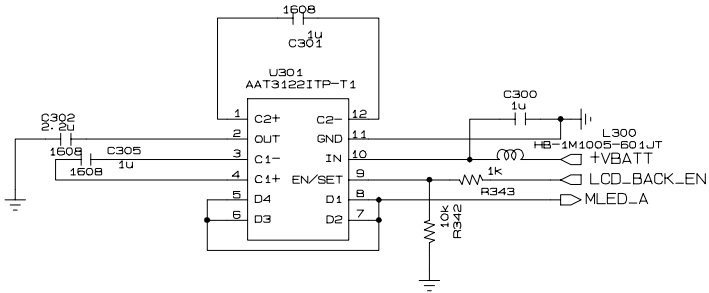
C251 (1u)

B->C

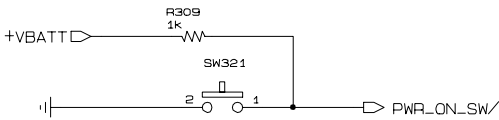
ADD :

R230

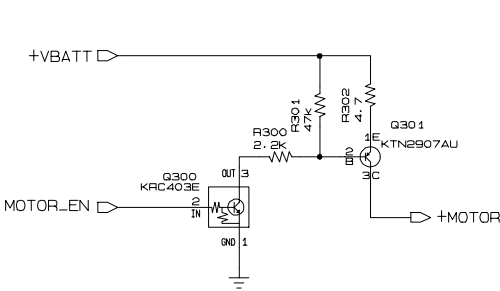
<CHARGE PUMP>



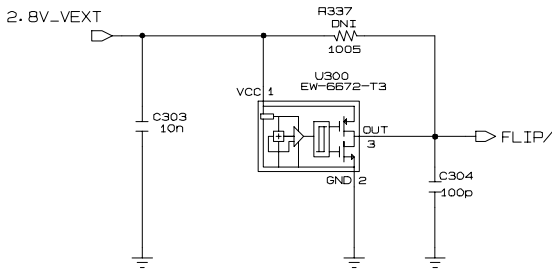
<POWER ON/OFF SWITCH>



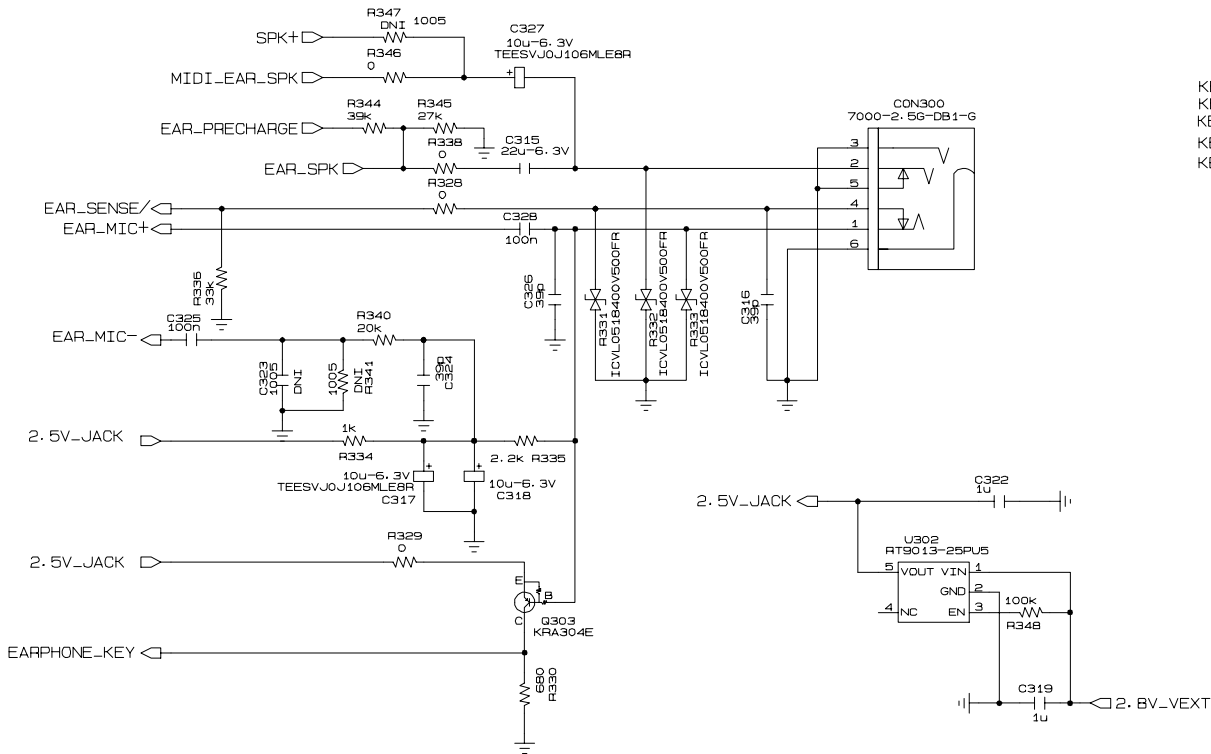
<MOTOR>



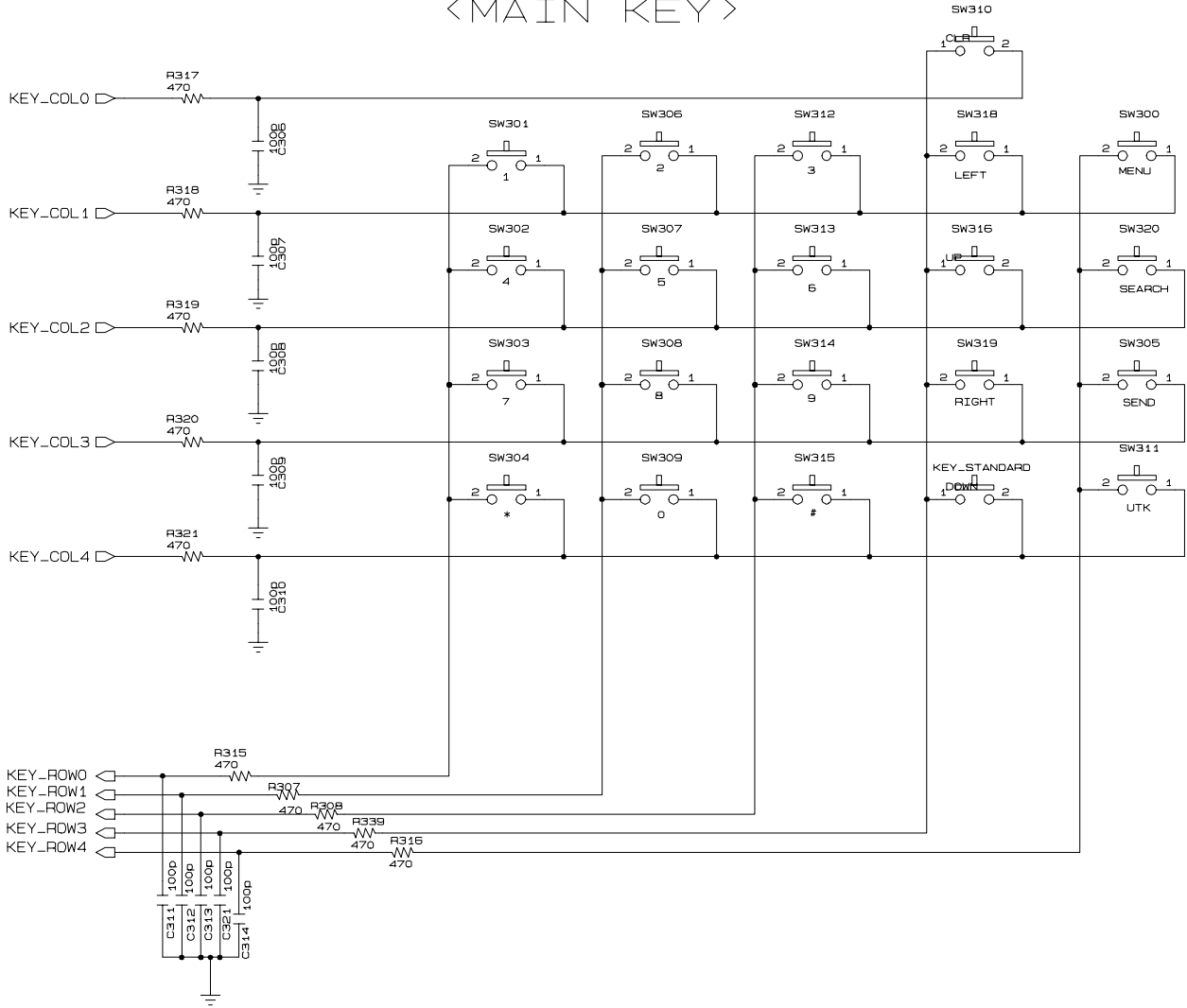
<FLIP S/W>



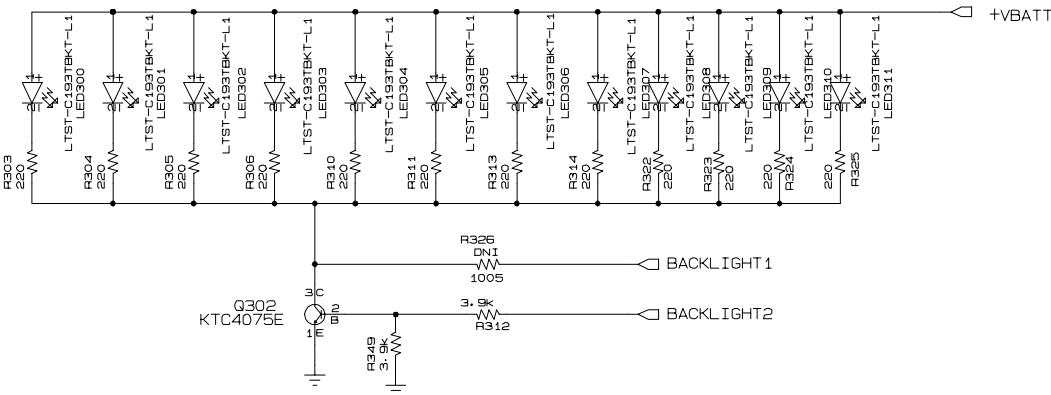
<EAR MIC JACK>



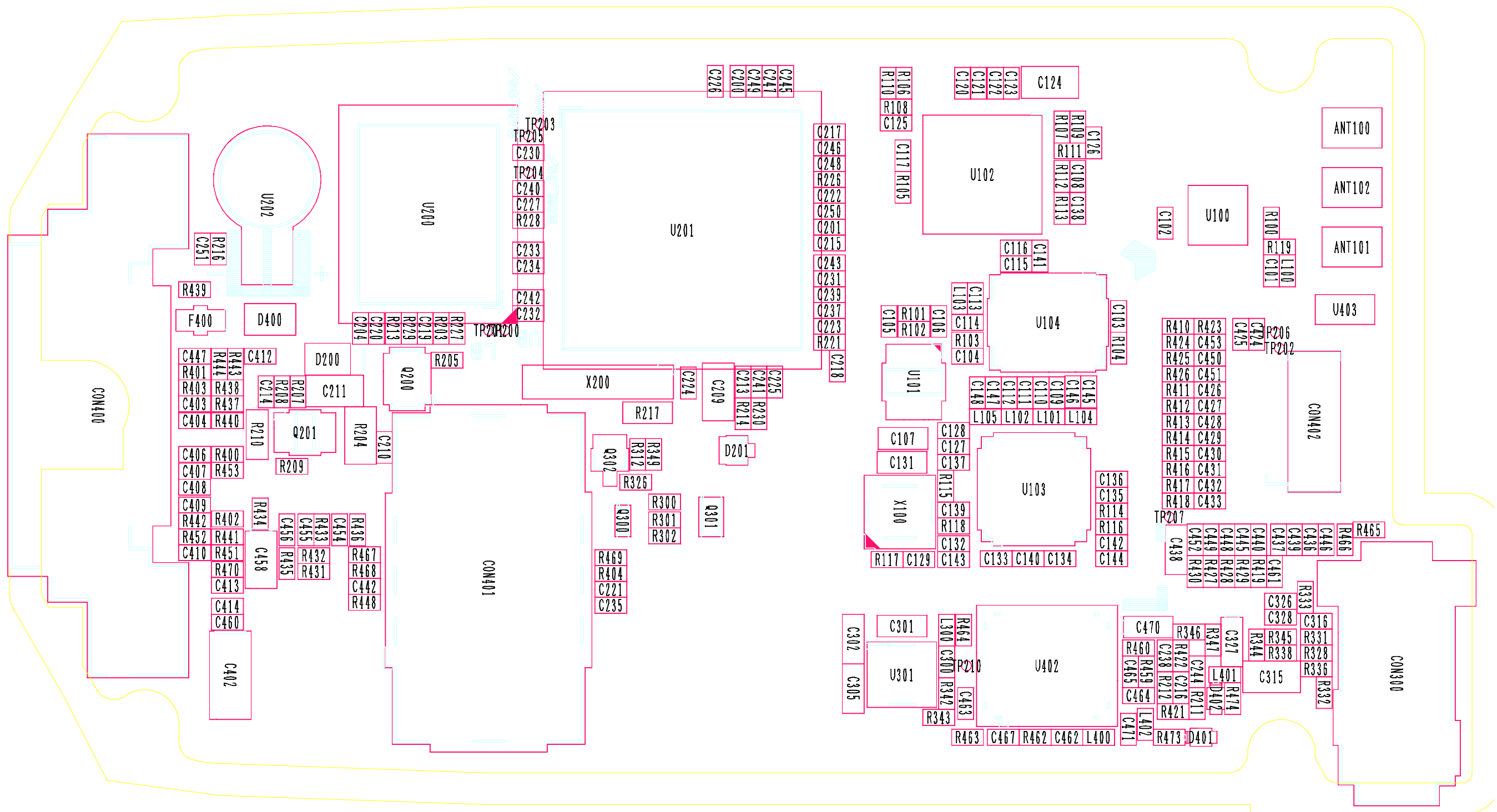
<MAIN KEY>

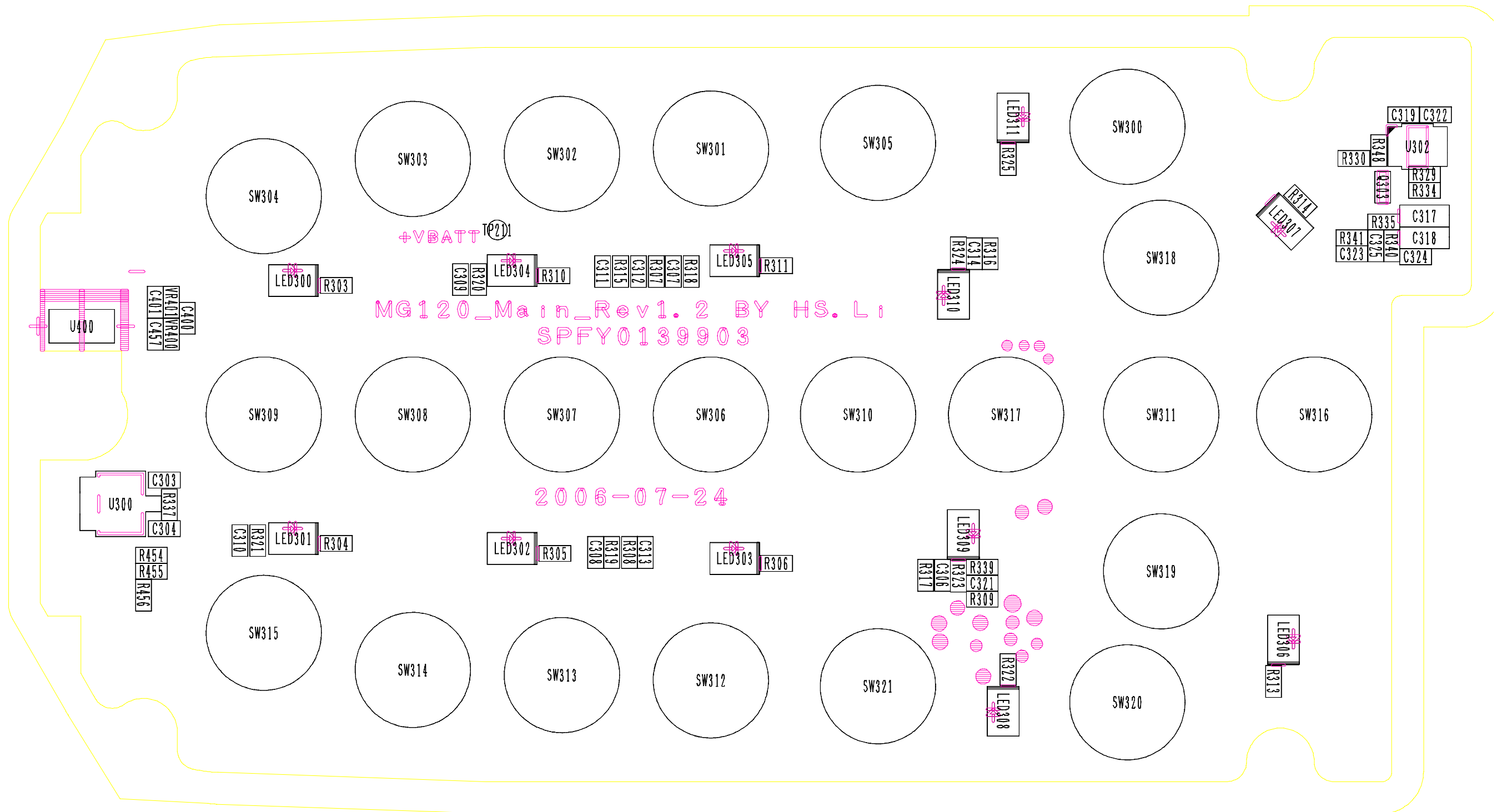


<KEYPAD LED>



A->B
ADD SHEET :
MIDI_EAR_SPK
ADD :
C327
R346(0)
R347(DNI)
CHANGE :
R327->C328
C316 :
(10n->39p)
R336 :
(100k->33k)
B->C
C302
1u->2.2u
ADD : L300
R348(100K)
CHANGE :
U302
C->D
ADD :
R349(3.9K)
CHANGE :
R312
(1K->3.9K)





6. ENGINEERING MODE

A. About Engineering Mode

Engineering mode is designed to allow a service man/engineer to view and test the basic functions provided by a handset.

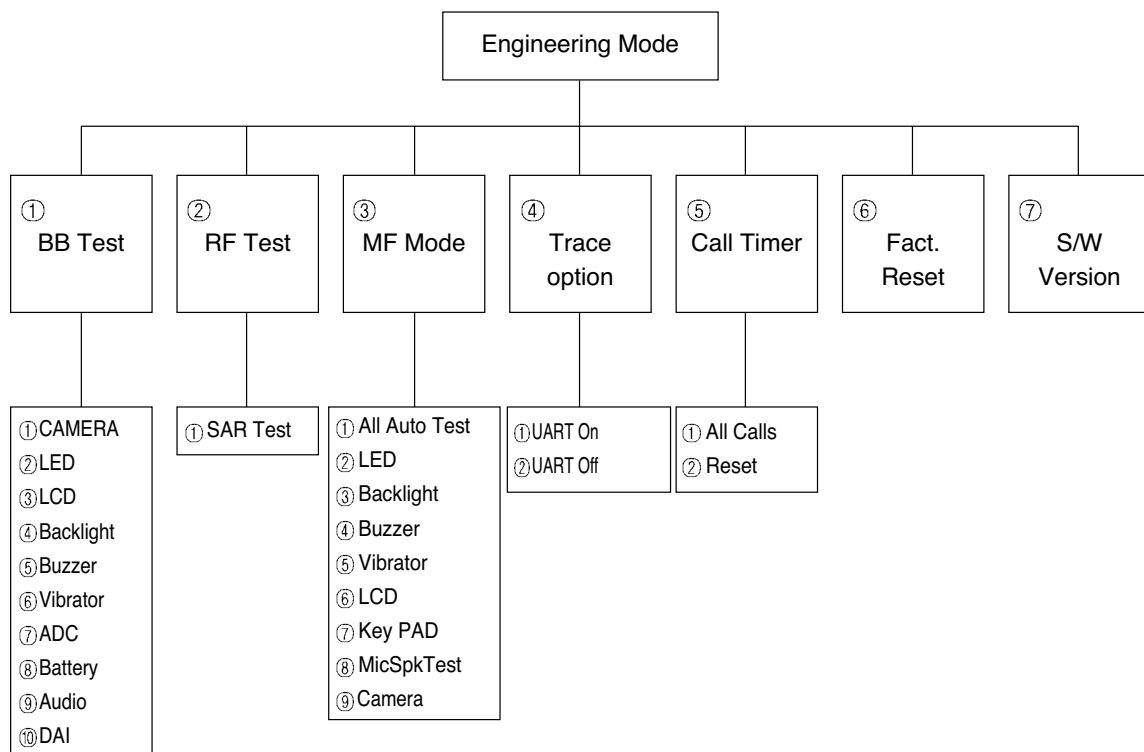
B. Access Codes

The key sequence for switching the engineering mode on is 2945##. Pressing END will switch back to non-engineering mode operation.

C. Key Operation

Use Up and Down key to select a menu and press 'select' key to progress the test. Pressing 'back' key will switch back to the original test menu.

D. Engineering Mode Menu Tree



6. ENGINEERING MODE

6.1 BB Test [MENU 1]

6.1.1 CAMERA

This menu is to test the Camera.

- 1) Main LCD preview : It shows the picture on Main LCD.

6.1.2 LED

This menu is to test the LED.

- 1) Green On
- 2) Green Off
- 3) Red On
- 4) Red Off

6.1.3 LCD

- 1) COLOUR : WHITE, RED, GREEN, BLUE, BLACK
- 2) Contrast Value

6.1.4 Backlight

This menu is to test the LCD Backlight and Keypad EL Backlight.

- 1) Backlight on : LCD Backlight and Keypad EL Backlight light on at the same time.
- 2) Backlight off : LCD Backlight and Keypad EL Backlight light off at the same time.
- 3) Backlight value : This controls brightness of Backlight. When entering into the menu, the present backlight-value in the phone is displayed. Use Left/Right key to adjust the level of brightness. The value of the brightness set at last will be saved in the NVRAM.

6.1.5 Buzzer

This menu is to test the melody sound.

- 1) Melody on : Melody sound is played through the speaker.
- 2) Melody off : Melody sound is off.

6.1.6 Vibrator

This menu is to test the vibration mode.

- 1) Vibrator on : Vibration mode is on.
- 2) Vibrator off : Vibration mode is off.

6.1.7 ADC (Analog to Digital Converter)

This displays the value of each ADC.

- 1) MVBAT ADC : Main Voltage Battery ADC
- 2) AUX ADC : Auxiliary ADC
- 3) TEMPER ADC : Temperature ADC

6.1.8 BATTERY

- 1) Bat Cal : This displays the value of Battery Calibration.

The following menus are displayed in order : BAT_LEV_4V, BAT_LEV_3_LIMIT, BAT_LEV_2_LIMIT, BAT_LEV_1_LIMIT, BAT_IDLE_LIMIT, BAT_INCALL_LIMIT, SHUT_DOWN_VOLTAGE, BAT_RECHARGE_LMT

- 2) TEMP Cal : This displays the value of Temperature Calibration.

The following menus are displayed in order : TEMP_HIGH_LIMIT, TEMP_HIGH_RECHARGE_LMT, TEMP_LOW_RECHARGE_LMT, TEMP_LOW_LIMIT

6.1.9 Audio

This is a menu for setting the control register of Voiceband Baseband Codec chip.

Although the actual value can be written over, it returns to default value after switching off and on the phone.

- 1) VbControl1 : VbControl1 bit Register Value Setting
- 2) VbControl2 : VbControl2 bit Register Value Setting
- 3) VbControl3 : VbControl3 bit Register Value Setting
- 4) VbControl4 : VbControl4 bit Register Value Setting
- 5) VbControl5 : VbControl5 bit Register Value Setting
- 6) VbControl6 : VbControl6 bit Register Value Setting

6.1.0 DAI (Digital Audio Interface)

This menu is to set the Digital Audio Interface Mode for Speech Transcoder and Acoustic testing.

- 1) DAI AUDIO : DAI audio mode
- 2) DAI UPLINK : Speech encoder test
- 3) DAI DOWNLINK : Speech decoder test
- 4) DAI OFF : DAI mode off

6. ENGINEERING MODE

6.2 RF Test [MENU 2]

6.2.1 SAR test

This menu is to test the Specific Absorption Rate.

- 1) SAR test on : Phone continuously process TX only. Call-setup equipment is not required.
- 2) SAR test off : TX process off

6.3 MF mode [MENU 3]

This manufacturing mode is designed to do the baseband test automatically. Selecting this menu will process the test automatically, and phone displays the previous menu after completing the test.

6.3.1 All auto test

LCD, Backlight, Vibrator, Buzzer, Key Pad, Mic&Speaker,

6.3.2 Backlight

LCD Backlight is on for about 1.5 seconds at the same time, then off.

6.3.3 Buzzer

This menu is to test the volume of Melody. It rings in the following sequence. Volume 1, Volume 2, Volume 3, Volume 0 (mute), Volume 4, Volume 5.

6.3.4 Vibrator

Vibrator is on for about 1.5 seconds.

6.3.5 LCD

1)LCD

Main LCD screen resolution tests horizontally and vertically one by one and fills the screen.

6.3.6 Key pad

When a pop-up message shows 'Press Any Key', you may press any keys including side keys, but not [Soft2 Key]. If the key is working properly, name of the key is displayed on the screen. Test will be completed in 15 seconds automatically.

6.3.7 MicSpk Test

The sound from MIC is recorded for about 3 seconds, then it is replayed on the speaker automatically.

6.4 Trace option [MENU 4]

This is NOT a necessary menu to be used by neither engineers nor users.

6.5 Call timer [MENU 5]

This menu is to set the Digital Audio Interface Mode for Speech Transcoder and Acoustic testing.

- 1) All calls : This displays total conversation time. User cannot reset this value.
- 2) Reset settings : This resets total conversation time to this, [00:00:00].

6.6 Fact. Reset [MENU 6]

This Factory Reset menu is to format data block in the flash memory and this procedure set up the default value in data block.

Attention

- ① Fact. Reset (i.e.Factory Reset) should be only used during the Manufacturing process.
- ② Servicemen should NOT progress this menu, otherwise some of valuable data such as Setting value, RF Calibration data, etc. cannot be restored again.

6.7 S/W version

This displays software version stored in the phone.

7. STAND ALONE TEST

7. STAND ALONE TEST

7.1 Introduction

This manual explains how to examine the status of RX and TX of the model.

A. Tx Test

TX test - this is to see if the transmitter of the phones is activating normally.

B. Rx Test

RX test - this is to see if the receiver of the phones is activating normally.

7.2 Setting Method

A. COM port

- a. Move your mouse on the "Connect" button, then click the right button of the mouse and select "Com setting".
- b. In the "Dialog Menu", select the values as explained below.
 - Port : select a correct COM port
 - Baud rate : 38400
 - Leave the rest as default values

B. Tx

1. Selecting Channel

- Select one of GSM or DCS Band and input appropriate channel.

2. Selecting APC

- a. Select either Power level or Scaling Factor.
- b. Power level
 - Input appropriate value GSM (between 5~19) or DCS (between 0~15)
- c. Scaling Factor
 - A 'Ramp Factor' appears on the screen.
 - You may adjust the shape of the Ramp or directly input the values.

C. Rx

1. Selecting Channel

- Select one of GSM or DCS Band and input appropriate channel.

2. Gain Control Index (0~ 26) and RSSI level

- See if the value of RSSI is close to -16dBm when setting the value between 0 ~ 26 in Gain Control Index.
- Normal phone should indicate the value of RSSI close to -16dBm.

7.3 Means of Test

- Select a COM port
- Set the values in Tx or Rx
- Select band and channel
- After setting them all above, press connect button.
- Press the start button

The screenshot displays the 'HW Test' application window. It features two main configuration panels for Tx and Rx, a COM port section, and a Signal section.

Tx Configuration:

- Radio buttons for **GSM** (selected) and **DCS**.
- Input fields for **62** and **700**.
- A button labeled **APC**.
- Radio buttons for **Power Level** (selected) and **Scaling Factor**.
- Input fields for **10** and **32767**.

Rx Configuration:

- Radio buttons for **GSM** (selected) and **DCS**.
- Input fields for **62** and **700**.
- A button labeled **Gain Control Index**.
- An input field for **15**.
- A button labeled **RSSI Level**.
- An input field for **(dBm)**.

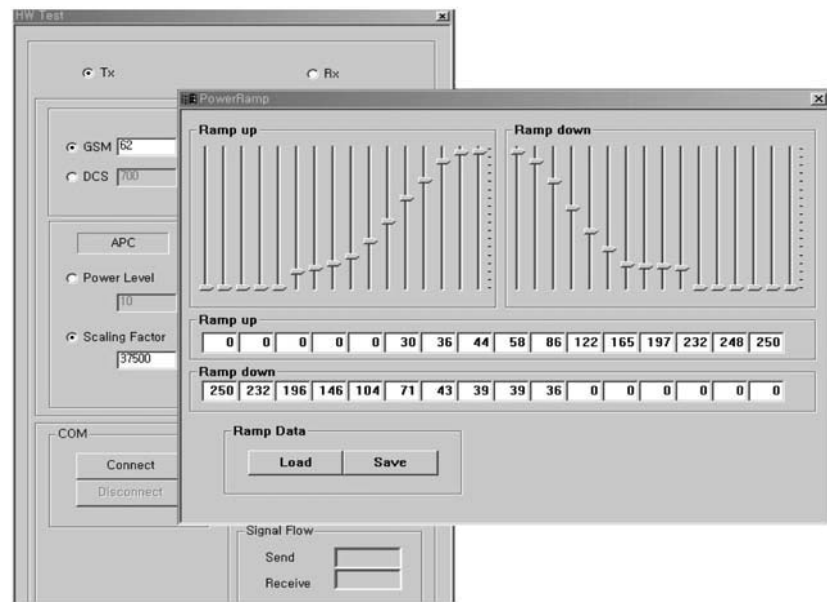
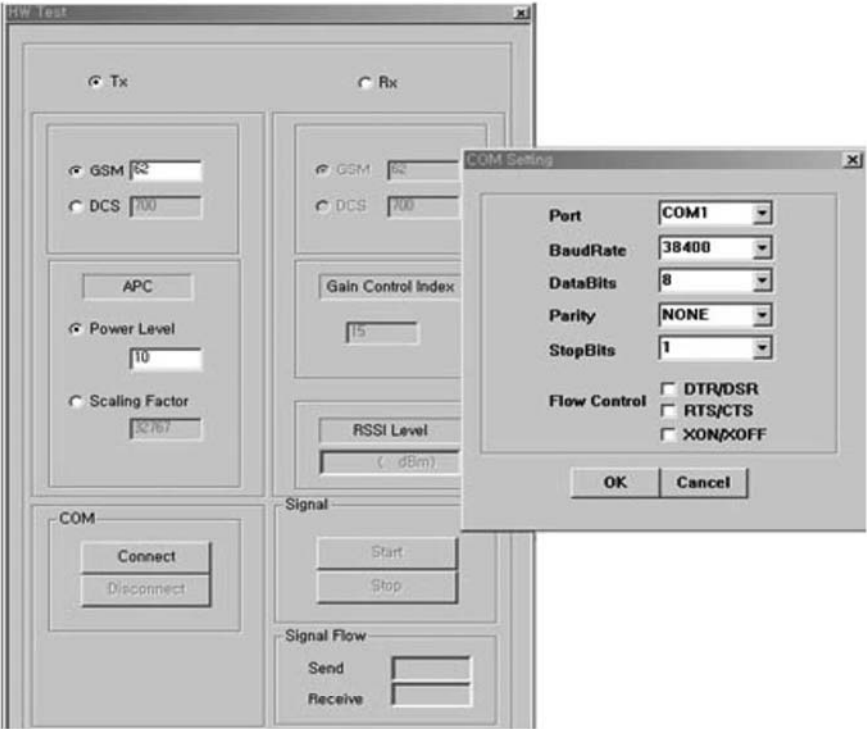
COM Section:

- Buttons for **Connect** and **Disconnect**.

Signal Section:

- Buttons for **Start** and **Stop**.
- Signal Flow** section with **Send** and **Receive** buttons, each with an adjacent input field.

7. STAND ALONE TEST



8. Calibration

8.1.H/W Tool Setup

| Tool List | Option | Reference |
|------------------------|-----------------------------|-----------------|
| RF test set | 8960/ Agilent | Address 1 |
| Power Supply | 66311B/Agilent | Address 2 |
| PC | Only Windolw2000 or WinXP | English Version |
| PIF Jig | Dip sw mode "ADI" | |
| GPIB card & Install SW | | |
| GPIB Cable | | |
| RS 232 Cable | | |
| RF Cable | MXGT83QE3000 MURTA | |
| I/O Cable | EDGE Cable + Connect zender | |
| Connect cable | | |

Table8-1 Tool List

8.2 Test Jig Operation

Table 8-2 Test Jig Power

| Power Source | Description |
|----------------|---------------------------------|
| Power Supply | usually 4.2V |
| Travel Adaptor | Use TA, name is TA-22GT2(24pin) |

Table 8-3 Test Jig SW Setup

| Switch Number | Name | Description |
|---------------|------------|---|
| Switch 1 | ADI-REMOTE | In ON state, phone is awaked. It is used ADI chipset. |
| Switch 2 | TI-REMOTE | In ON state, phone is awaked. It is used TI chipset. |
| Switch 3 | VBAT | Power is provided for phone from battery |
| Switch 4 | PS | Power is provided for phone from Power supply |

8. Calibration

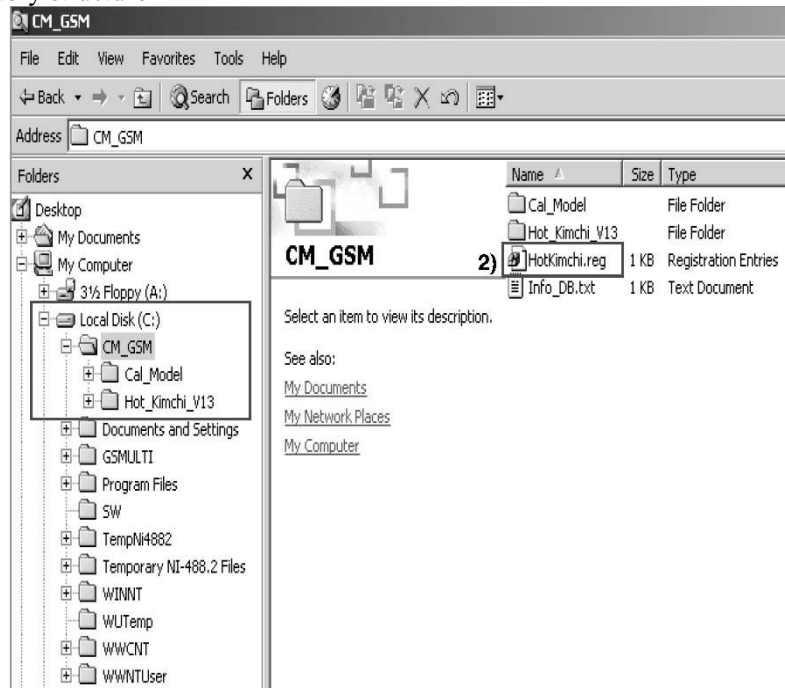
Table 8-4 Test Jig LED

| LED Number | Name | Description |
|------------|-------|--|
| LED 1 | Power | Power is provided for Test Jig |
| LED 2 | TA | Indicate charging state of the phone battery |
| LED 3 | UART | Indicate data transfer state through the UART port |
| LED 4 | MON | Indicate data transfer state through the MON port |

1. Connect RS232 serial cable is connected between COM port of PC and MON port of TEST JIG, in general
2. Set the Power Supply 4.2V
3. Set the 3rd, 4th of DIP SW ON state always
4. Press the Phone power key, if the Remote ON is used, 1st ON state

8.3 Install & Directory structure

- 1) Copy a Cal. Program in local Disk(C:). This program name is “Hotkimchi”
 - Folder name : Only “CM_GSM”
 - This Cal. Program is on GCSC Website
 - Execute by double click : 3) Directory structure
- 2) Registry of Calibration Program
 - Execute by double click : HotKimchi.reg
- 3) Directory structure

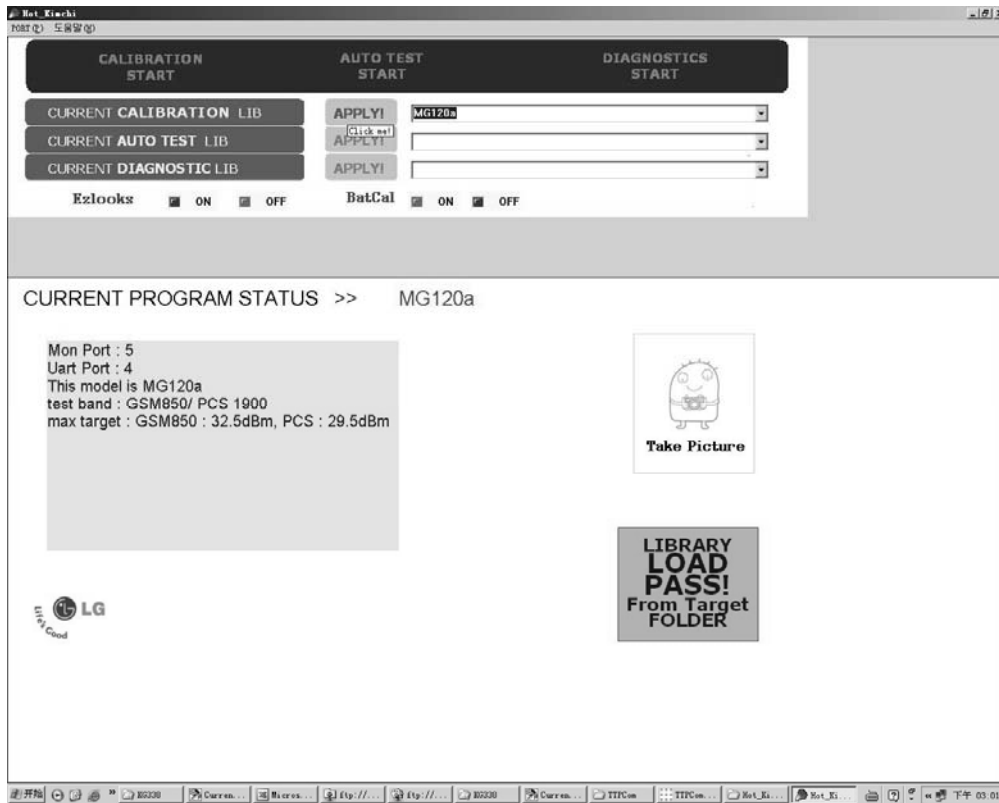


- 4) Copy the director which contains Model file to //CM_GSM/Cal_Model

8.4 Cal. Procedure

- 1) Execute.Hot_Kimchi.exe

8. Calibration



① Click. And choose the model name.

② Click.

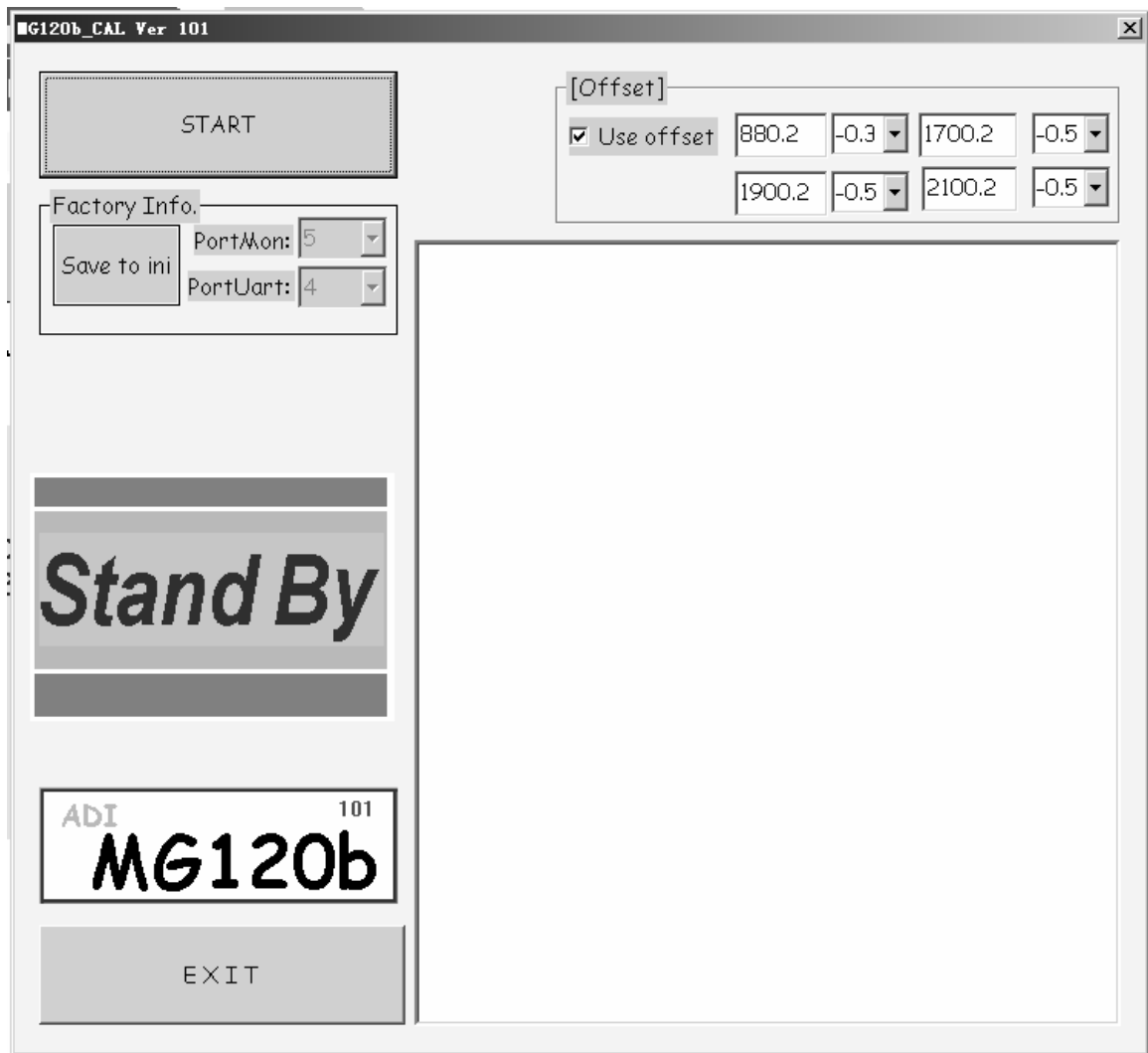
APPLY!

③ Click.

**CALIBRATION
START**

When the left window pop-up,

8. Calibration



first of all turn on the phone.

And then click **Start** button after finishing turn on

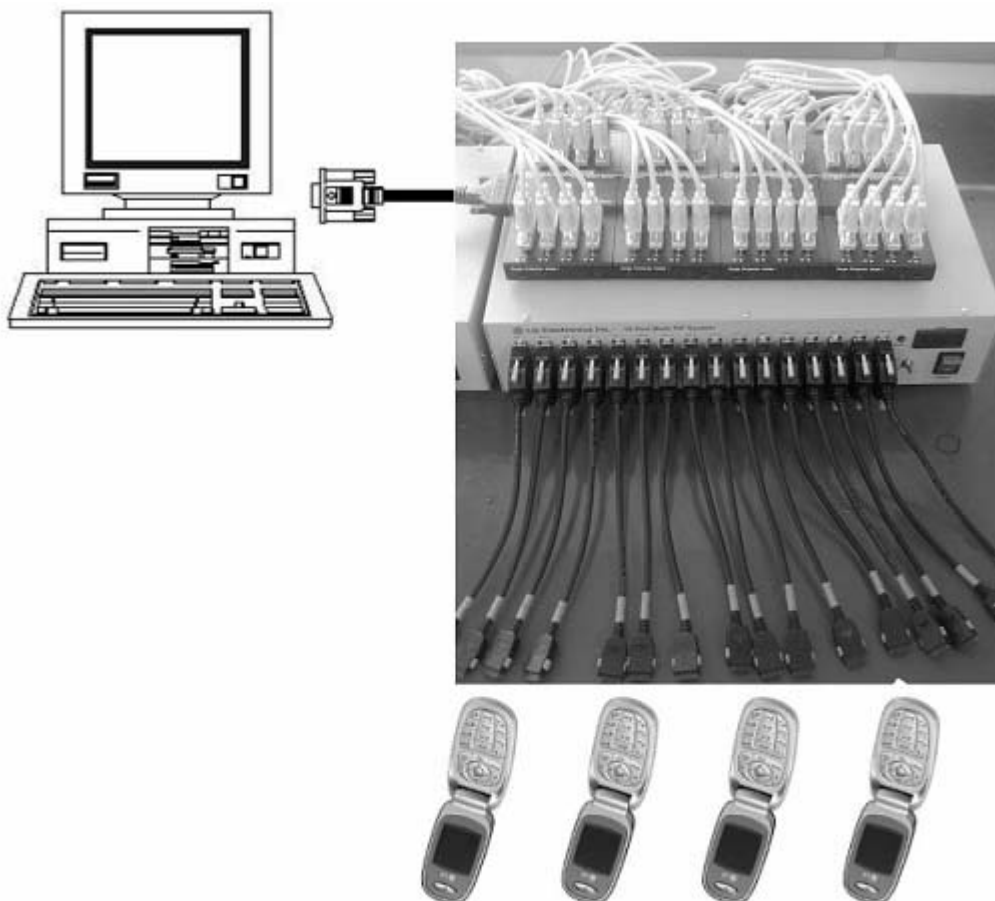
- ④ The software is just progress screen.
Phone is being auto re-start after finishing cal.

9. DOWNLOAD

9.1 Download

A. Download Setup

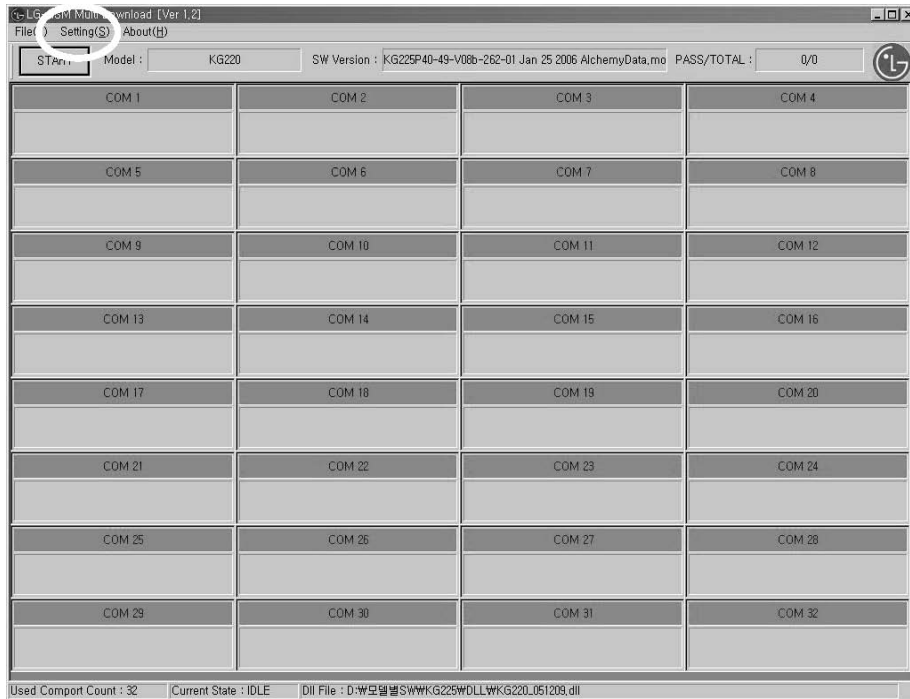
Figure describes Download setup



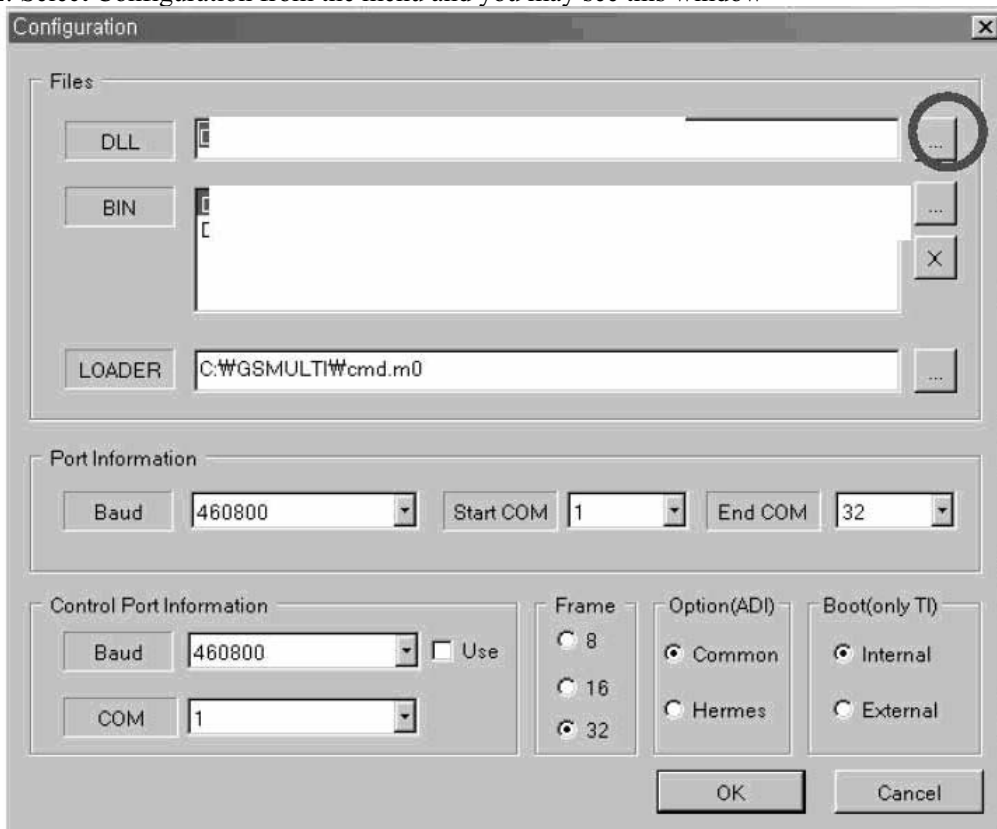
B. Multi Download Procedure


1. Run GSM Multi Download program and select Setting


9. DOWNLOAD



2. Select Configuration from the menu and you may see this window



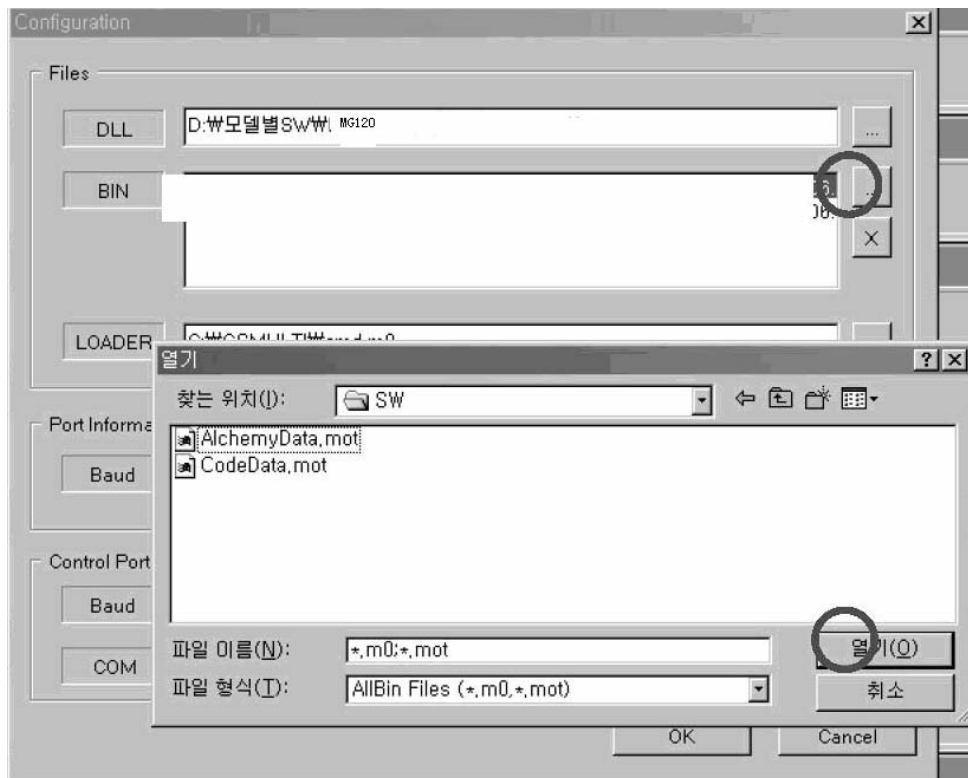
3. Press  key to select the DLL files

4. Press  key to select the mot files

5. Select AlchemyData.mot and press open

9. DOWNLOAD

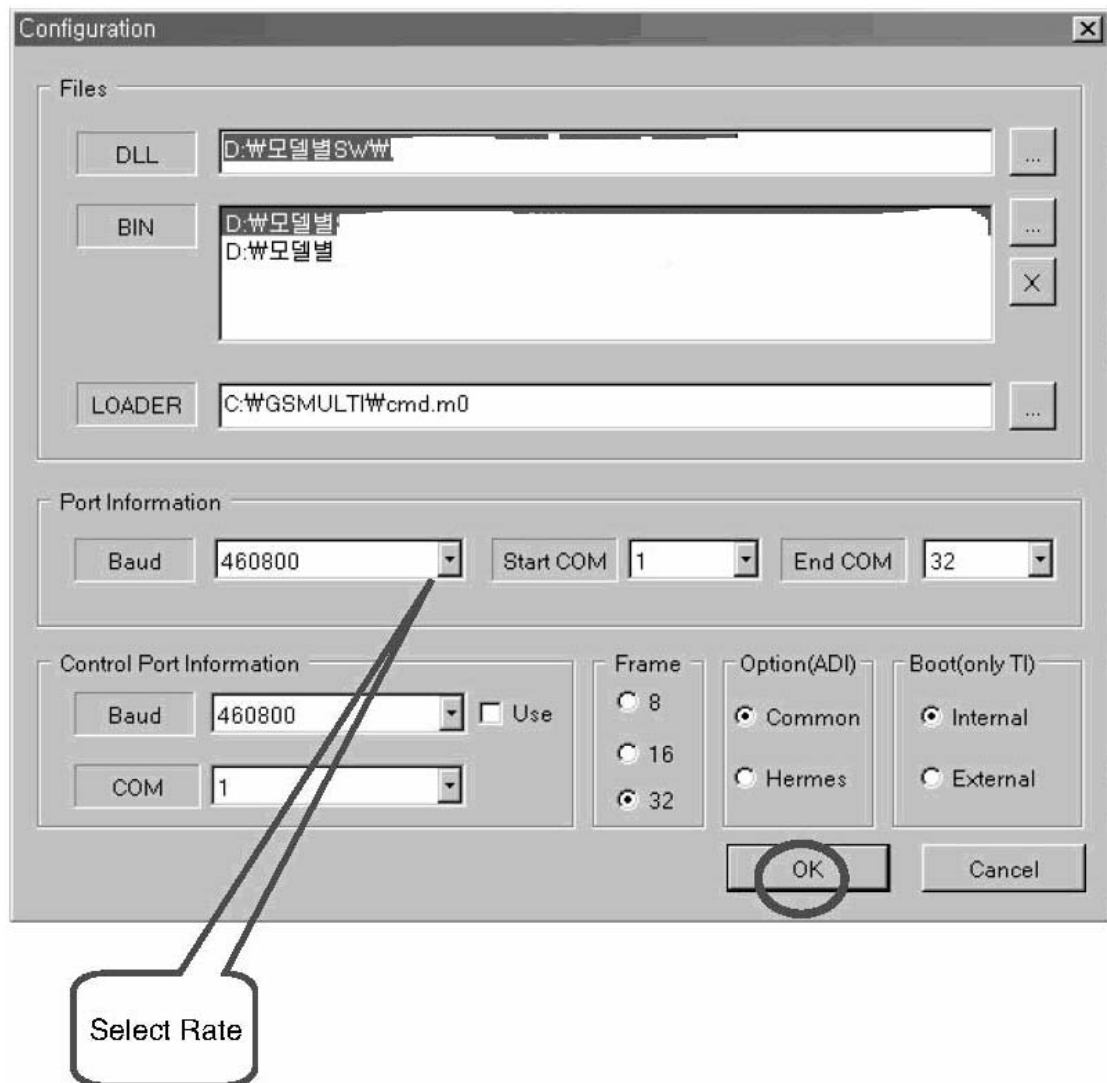
6. Repeat step 4-5 to select CodeData.mot



7. Check if the ADI option is set to Hermes

8. Press OK to end Configuration

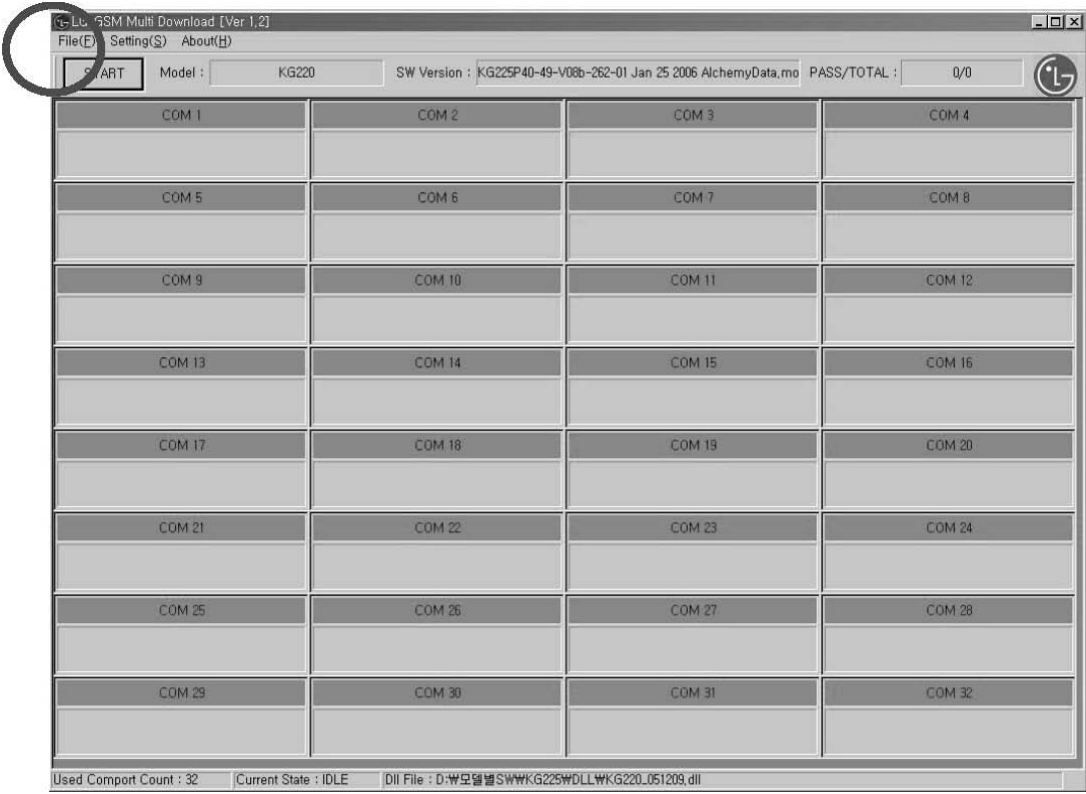
9. DOWNLOAD



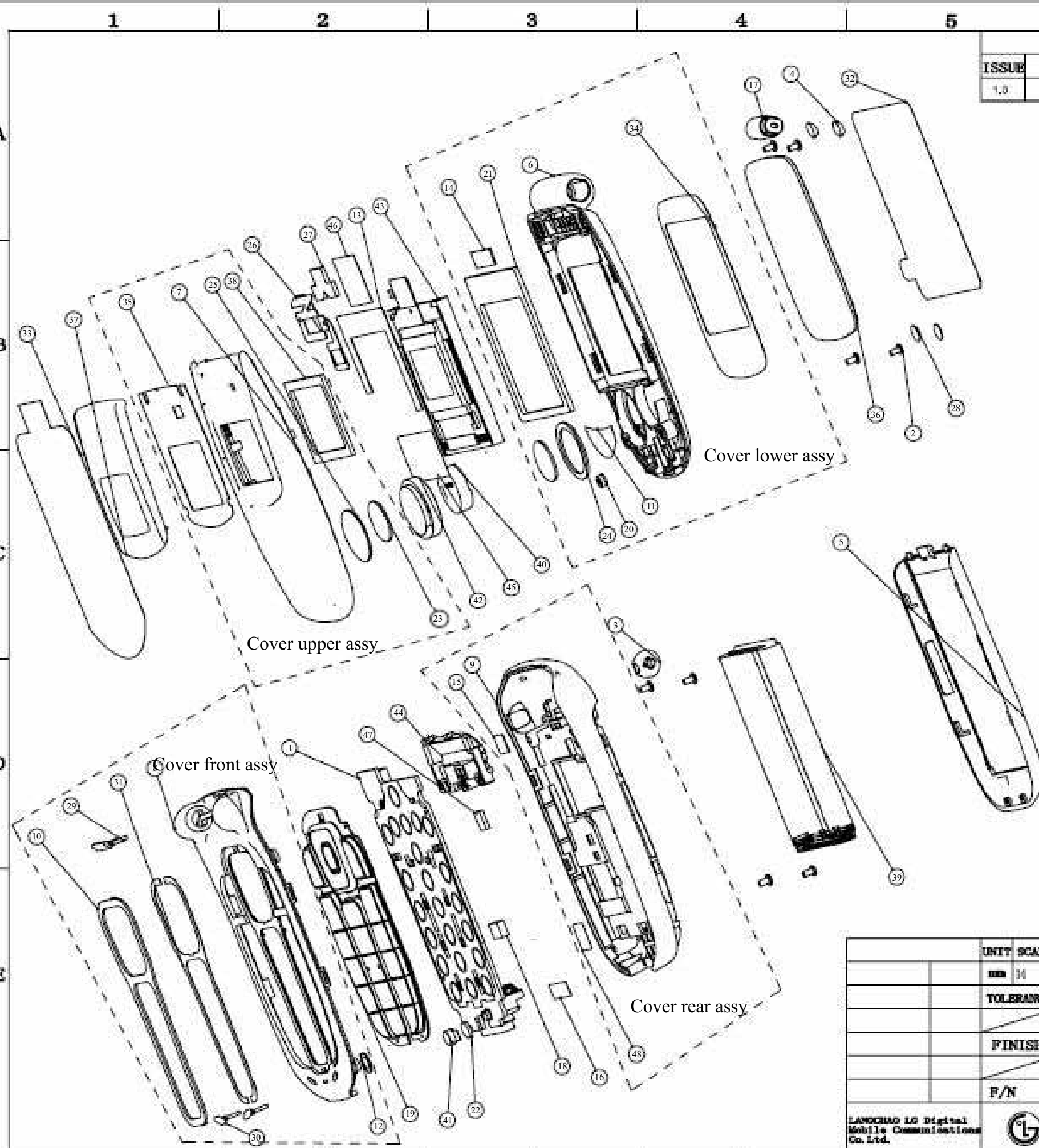
9. Press START to execute download

10. Once downloading is started, press STOP button to keep from re-downloading after downloading is completed.

9. DOWNLOAD



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| REVISION | | | | |
|----------|-------------|------------|----------|------------|
| ISSUE | CONTENTS | ENGINEER | APPROVER | DATE |
| 1.0 | 1st Drawing | Yu Haiyuan | Kim Y.M | 2008.08.04 |

| | | | | |
|----|------------------------|------|-------------|--------|
| 48 | GASKET PCB 2 | 1 | MGAZ0041401 | |
| 47 | GASKET PCB 1 | 1 | MGAZ0041201 | |
| 46 | GASKET LCD | 1 | MGAZ0041101 | |
| 45 | INSULATOR,FOLDER | 1 | MIDA0024101 | |
| 44 | ANTTENA | 1 | SNGF0020201 | |
| 43 | LCD | 1 | SVLY0026601 | |
| 42 | SPK | 1 | SUSY0015501 | |
| 41 | MIC | 1 | SUMY0003809 | |
| 40 | MOTOR | 1 | SJMY0002601 | |
| 39 | BATTERY | 1 | SBPL0086001 | |
| 38 | FPCB | 1 | SACE0047001 | |
| 37 | WINDOW,SUB | 1 | MWAF0034201 | |
| 36 | WINDOW LCD (MAIN) | 1 | MWAF0069501 | |
| 35 | TAPE,WINDOW(SUB) | 1 | MTAE0028401 | |
| 34 | TAPE,WINDOW(MAIN) | 1 | MTAD0055901 | |
| 33 | TAPE,PROTELCD(SUB) | 1 | MTAB0064101 | |
| 32 | TAPE,PROTELCD(MAIN) | 1 | MATB0015802 | |
| 31 | TAPE,DEC,FRONT | 1 | MTAA0114001 | |
| 30 | STOPPER,L/R | 2 | MSGY0016603 | |
| 29 | STOPER,HINGE | 1 | MSGB0015003 | |
| 28 | PLATE,COVER L/R | 2 | MPFB0002001 | |
| 27 | PAD,FPCB | 1 | MPBA0138501 | |
| 26 | PAD,LCD(SUB) | 1 | MPBQ0029101 | |
| 25 | PAD,RECEIVER(UPPER) | 1 | MPBM0013601 | |
| 24 | PAD,RECEIVER(LOWER) | 1 | MPBM0013101 | |
| 23 | PAD,MOTOR | 2 | MPBJ0032601 | |
| 22 | PAD,MIC | 1 | MPBH0026901 | |
| 21 | PAD,LCD(MAIN) | 1 | MPBG0048701 | |
| 20 | MAGNET SWITCH | 1 | MMAA0001601 | |
| 19 | KEYPAD | 1 | MKAZ0030203 | |
| 18 | TAPE INSULATOR | 1 | MIDZ0107701 | |
| 17 | HINGE | 1 | MGFD0003701 | |
| 16 | GASKET,RECEPTACLE | 1 | MGAZ0034401 | |
| 15 | GASKET,CONNECTOR,REAR | 1 | MGAZ0034301 | |
| 14 | GASKET,CONNECTOR,LOWER | 1 | MGAZ0034201 | |
| 13 | GASKET LCD 2 | 1 | MGAZ0044901 | |
| 12 | FILTER,MIC | 1 | MPBH0026901 | |
| 11 | FILTER,SPK | 1 | MFBB0016401 | |
| 10 | DECO,FRONT | 1 | MDAG0020903 | |
| 9 | COVER REAR | 1 | MCJN0056101 | |
| 8 | COVER FRONT | 1 | MCJK0059203 | |
| 7 | COVER UPPER | 1 | MCJJ0044801 | |
| 6 | COVER FOLDER | 1 | MCJH0035902 | |
| 5 | COVER BATTERY | 1 | MCJA0033303 | |
| 4 | CAP,SCREW | 2 | MCCH0089902 | |
| 3 | CAP EARPHONE | 1 | MCCH0038203 | |
| 2 | SCREW MACHINE,BIND | 8 | GMEY0002001 | |
| 1 | PCB | 1 | SAFY0184901 | |
| NO | DESCRIPTION | Q'TY | DRWING NO | REMARK |

| UNIT | SCALE | NO. | DESCRIPTION | Q'TY | DRAWING NO. | REMARK |
|--|----------|------------|-------------|----------|-----------------|--------|
| mm | 1:1 | | PARTS INDEX | | | |
| TOLERANCE | | DATE | NAME | MATERIAL | KG120 PHONE | |
| APP. | 20-07-05 | Yu Haiyuan | | | | |
| FINISH | CHGC. | | | REL DWG | | |
| DRSG. | 25-Ju-05 | Yu Haiyuan | | DWG NAME | | |
| F/N | | | SIZE | DWG NO. | APEY0369401-MP | |
| LAWCHANG LG Digital Mobile Communications Co. Ltd. | | | LG | | LCLG<24> A-5923 | |

11. Appendix

11. Appendix

Components List

| Ref No | Part Name | Part Number | Color | Remark |
|--------|--------------------------|-------------|---------------|--------|
| | GSM(FOLDER) | TGFF0092809 | Dark Gray | |
| AAAY00 | ADDITION | AAAY0188001 | Without Color | |
| ACGA00 | COVER ASSY,BATTERY | ACGA0016303 | BROWN | 5 |
| MCJA00 | COVER,BATTERY | MCJA0033303 | BROWN | |
| AMBA00 | MANUAL ASSY,OPERATION | AMBA0082501 | Without Color | |
| MMBB00 | MANUAL,OPERATION | MMBB0224401 | Without Color | |
| SBPL00 | BATTERY PACK,LI-ION | SBPL0086002 | | 39 |
| SSAD00 | ADAPTOR,AC-DC | SSAD0007873 | | |
| APAY00 | PACKAGE | APAY0075701 | Without Color | |
| APLY00 | PALLET ASSY | APLY0001101 | Without Color | |
| MBEC00 | BOX,CARTON | MBEC0000207 | Without Color | |
| MCJZ00 | COVER | MCJZ0030501 | Without Color | |
| MPCY00 | PALLET | MPCY0013701 | Without Color | |
| MSCY00 | SLEEVE | MSCY0001001 | Without Color | |
| MBAD00 | BAG,VINYL(PE) | MBAD0005201 | DARK BLUE | |
| MBEE00 | BOX,MASTER | MBEE0051801 | Without Color | |
| MBEF | BOX,UNIT | MBEF0112901 | Without Color | |
| MLAC00 | LABEL,BARCODE | MLAC0004502 | Without Color | |
| MLAJ00 | LABEL,MASTER BOX | MLAJ0004401 | Without Color | |
| MPAD00 | PACKING,SHELL | MPAD0005804 | Without Color | |
| APEY00 | PHONE | APEY0369401 | Without Color | |
| ACGG00 | COVER ASSY,FOLDER | ACGG0075001 | BROWN | |
| ACGH00 | COVER ASSY,FOLDER(LOWER) | ACGH0044902 | Black | |
| MCJH00 | COVER,FOLDER(LOWER) | MCJH0035902 | Black | |
| MFBB00 | FILTER,RECEIVER | MFBB0016401 | Black | 11 |
| MGAZ00 | GASKET | MGAZ0034201 | Black | 14 |
| MMAA00 | MAGNET,SWITCH | MMAA0001601 | Silver | 20 |
| MPBG00 | PAD,LCD | MPBG0048901 | Black | |
| MPBJ00 | PAD,MOTOR | MPBJ0032601 | Black | 23 |
| MPBM00 | PAD,RECEIVER | MPBM0013101 | Black | 24 |
| MTAD00 | TAPE,WINDOW | MTAD0055901 | Yellow | 34 |
| ACGJ00 | COVER ASSY,FOLDER(UPPER) | ACGJ0058701 | BROWN | 7 |
| MCJJ00 | COVER,FOLDER(UPPER) | MCJJ0044801 | BROWN | |
| MPBJ00 | PAD,MOTOR | MPBJ0032601 | Black | |
| MPBM00 | PAD,RECEIVER | MPBM0013601 | Black | 25 |
| MPBQ00 | PAD,LCD(SUB) | MPBQ0029101 | Black | 26 |
| MTAE00 | TAPE,WINDOW(SUB) | MTAE0028401 | Yellow | 35 |
| ACGK00 | COVER ASSY,FRONT | ACGK0074803 | Black | 8 |
| MCJK00 | COVER,FRONT | MCJK0059203 | Black | |
| MDAG00 | DECO,FRONT | MDAG0020903 | Black | 10 |

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| Ref No | Part Name | Part Number | Color | Remark |
|--------|------------------------------|-------------|---------------|--------|
| MPBH00 | PAD,MIKE | MPBH0026901 | Black | 22 |
| MSGB00 | STOPPER,HINGE | MSGB0015003 | Black | 29 |
| MSGY00 | STOPPER | MSGY0016603 | Black | 30 |
| MTAA00 | TAPE,DECO | MTAA0114901 | Without Color | 31 |
| GMEY00 | SCREW MACHINE,BIND | GMEY0009201 | Black | 2 |
| MCCH01 | CAP,SCREW | MCCH0089902 | Black | 4 |
| MGAZ00 | GASKET | MGAZ0044901 | Yellow | 13 |
| MGAZ01 | GASKET | MGAZ0041101 | Yellow | 46 |
| MHFD00 | HINGE,FOLDER | MHFD0003701 | Without Color | |
| MIDA00 | INSULATOR,LCD | MIDA0024101 | Blue | 45 |
| MPBZ00 | PAD | MPBZ0138501 | Black | |
| MPFB00 | PLATE,COVER | MPFB0002001 | Black | 28 |
| MTAB00 | TAPE,PROTECTION | MTAB0110201 | Without Color | |
| MTAB01 | TAPE,PROTECTION | MTAB0064101 | Without Color | 33 |
| MWAC00 | WINDOW,LCD | MWAC0069501 | Black | 36 |
| MWAF00 | WINDOW,LCD(SUB) | MWAF0034201 | Black | 37 |
| BFAA00 | FILM,INMOLD | BFAA0043901 | Black | |
| SACY00 | PCB ASSY,FLEXIBLE | SACY0052401 | | |
| SACB00 | PCB ASSY,FLEXIBLE,INSERT | SACB0033601 | | |
| SJMY00 | VIBRATOR,MOTOR | SJMY0007202 | | 40 |
| SUSY00 | SPEAKER | SUSY0015501 | | 42 |
| SVLM00 | LCD MODULE | SVLM0016702 | | |
| | LCD | SVLY0026601 | | 43 |
| SACE00 | PCB ASSY,FLEXIBLE,SMT | SACE0047001 | | 38 |
| SACC00 | PCB ASSY,FLEXIBLE,SMT BOTTOM | SACC0026101 | | |
| ENBY00 | CONNECTOR,BOARD TO BOARD | ENBY0022001 | | |
| SACD00 | PCB ASSY,FLEXIBLE,SMT TOP | SACD0036101 | | |
| ENBY00 | CONNECTOR,BOARD TO BOARD | ENBY0012301 | | |
| SPCY00 | PCB,FLEXIBLE | SPCY0094101 | | |
| ACGM00 | COVER ASSY,REAR | ACGM0076901 | BROWN | 9 |
| MCJN00 | COVER,REAR | MCJN0056101 | BROWN | |
| MGAZ00 | GASKET | MGAZ0034301 | Black | 15 |
| MIDZ00 | INSULATOR | MIDZ0107701 | Blue | |
| GMEY00 | SCREW MACHINE,BIND | GMEY0009201 | Black | |
| MCCC00 | CAP,EARPHONE JACK | MCCC0038203 | BROWN | 3 |
| MKAZ00 | KEYPAD | MKAZ0030203 | Black | 19 |
| MLAK00 | LABEL,MODEL | MLAK0006901 | | |
| SAFY00 | PCB ASSY,MAIN | SAFY0184301 | Without Color | |
| SAFB | PCB ASSY,MAIN,INSERT | SAFB0066401 | | |
| ADCA00 | DOME ASSY,METAL | ADCA0052701 | White | |
| MGAZ00 | GASKET | MGAZ0034401 | Black | 16 |

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| Ref No | Part Name | Part Number | Color | Remark |
|--------|--------------------------|-------------|---------------|--------|
| MGAZ01 | GASKET | MGAZ0041201 | Yellow | 47 |
| MGAZ02 | GASKET | MGAZ0041401 | Yellow | 48 |
| MPBH00 | PAD,MIKE | MPBH0023401 | Black | |
| SUMY00 | MICROPHONE | SUMY0003809 | | 41 |
| SAFF00 | PCB ASSY,MAIN,SMT | SAFF0105401 | | |
| MLAB00 | LABEL,A/S | MLAB0000601 | Without Color | |
| MLAZ00 | LABEL | MLAZ0038301 | Without Color | |
| SAFC00 | PCB ASSY,MAIN,SMT BOTTOM | SAFC0084701 | | 1 |
| C102 | CAP,CERAMIC,CHIP | ECCH0000115 | | |
| C103 | CAP,CHIP,MAKER | ECZH0001116 | | |
| C104 | CAP,CHIP,MAKER | ECZH0001116 | | |
| C105 | CAP,CHIP,MAKER | ECZH0001202 | | |
| C106 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C107 | CAP,CHIP,MAKER | ECZH0001511 | | |
| C108 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C113 | CAP,CHIP,MAKER | ECZH0000830 | | |
| C117 | CAP,CHIP,MAKER | ECZH0000830 | | |
| C120 | CAP,CERAMIC,CHIP | ECCH0000155 | | |
| C121 | CAP,CHIP,MAKER | ECZH0000816 | | |
| C122 | CAP,CERAMIC,CHIP | ECCH0000113 | | |
| C123 | CAP,CHIP,MAKER | ECZH0000830 | | |
| C124 | CAP,CERAMIC,CHIP | ECCH0000393 | | |
| C125 | CAP,CHIP,MAKER | ECZH0000830 | | |
| C126 | CAP,CERAMIC,CHIP | ECCH0000110 | | |
| C127 | CAP,CERAMIC,CHIP | ECCH0000115 | | |
| C128 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C129 | CAP,CHIP,MAKER | ECZH0001207 | | |
| C131 | CAP,CERAMIC,CHIP | ECCH0005603 | | |
| C132 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C133 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C134 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C135 | CAP,CERAMIC,CHIP | ECCH0000115 | | |
| C136 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C137 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C138 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C139 | CAP,CERAMIC,CHIP | ECCH0000143 | | |
| C140 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C141 | CAP,CERAMIC,CHIP | ECCH0000115 | | |
| C142 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C143 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C144 | CAP,CERAMIC,CHIP | ECCH0000143 | | |

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| Ref No | Part Name | Part Number | Color | Remark |
|--------|------------------|-------------|-------|--------|
| C145 | CAP,CHIP,MAKER | ECZH0000803 | | |
| C146 | CAP,CHIP,MAKER | ECZH0000803 | | |
| C147 | CAP,CHIP,MAKER | ECZH0000803 | | |
| C148 | CAP,CHIP,MAKER | ECZH0000803 | | |
| C200 | CAP,CERAMIC,CHIP | ECCH0000115 | | |
| C201 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C204 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C209 | CAP,CERAMIC,CHIP | ECCH0000393 | | |
| C210 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C211 | CAP,CHIP,MAKER | ECZH0025501 | | |
| C213 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C214 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C215 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C216 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C217 | CAP,CERAMIC,CHIP | ECCH0000122 | | |
| C218 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C219 | CAP,CERAMIC,CHIP | ECCH0000122 | | |
| C220 | CAP,CERAMIC,CHIP | ECCH0000122 | | |
| C221 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C222 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C223 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C224 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C225 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C226 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C227 | CAP,CERAMIC,CHIP | ECCH0000115 | | |
| C230 | CAP,CERAMIC,CHIP | ECCH0000143 | | |
| C231 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C232 | CAP,CERAMIC,CHIP | ECCH0000115 | | |
| C233 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C234 | CAP,CERAMIC,CHIP | ECCH0000115 | | |
| C235 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C237 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C238 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C239 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C240 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C241 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C242 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C243 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C244 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C245 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C246 | CAP,CHIP,MAKER | ECZH0001215 | | |

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| Ref No | Part Name | Part Number | Color | Remark |
|--------|-----------------------|-------------|-------|--------|
| C247 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C248 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C249 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C250 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C251 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C300 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C301 | CAP,CHIP,MAKER | ECZH0001501 | | |
| C302 | CAP,CHIP,MAKER | ECZH0001511 | | |
| C305 | CAP,CHIP,MAKER | ECZH0001501 | | |
| C315 | CAP,CERAMIC,CHIP | ECCH0000393 | | |
| C316 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C326 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C327 | CAP,TANTAL,CHIP,MAKER | ECTZ0005201 | | |
| C328 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C402 | CAP,TANTAL,CHIP,MAKER | ECTZ0000318 | | |
| C403 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C404 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C406 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C407 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C408 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C409 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C410 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C412 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C413 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C414 | CAP,CERAMIC,CHIP | ECCH0000155 | | |
| C424 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C425 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C426 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C427 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C428 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C429 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C430 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C431 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C432 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C433 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C436 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C437 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C438 | CAP,CHIP,MAKER | ECZH0001501 | | |
| C439 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C440 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C442 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| | | | | |

11. Appendix

| Ref No | Part Name | Part Number | Color | Remark |
|--------|--------------------------|-------------|-------|--------|
| C445 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C446 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C447 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C448 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C449 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C450 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C451 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C452 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C453 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C454 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C455 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C456 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C458 | CAP,TANTAL,CHIP,MAKER | ECTZ0003701 | | |
| C460 | CAP,CHIP,MAKER | ECZH0000830 | | |
| C461 | CAP,CHIP,MAKER | ECZH0000826 | | |
| C462 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C463 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C464 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C465 | CAP,CERAMIC,CHIP | ECCH0000187 | | |
| C467 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C470 | CAP,TANTAL,CHIP | ECTH0003701 | | |
| C471 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| CON300 | CONN,JACK/PLUG,EARPHONE | ENJE0004301 | | |
| CON400 | CONNECTOR,I/O | ENRY0003401 | | |
| CON401 | CONN,SOCKET | ENSY0014301 | | |
| CON402 | CONNECTOR,BOARD TO BOARD | ENBY0022101 | | |
| D200 | DIODE,SWITCHING | EDSY0012101 | | |
| D201 | DIODE,SWITCHING | EDSY0017301 | | |
| D400 | DIODE,SWITCHING | EDSY0006601 | | |
| D401 | DIODE,TVS | EDTY0009101 | | |
| D402 | DIODE,TVS | EDTY0009101 | | |
| F400 | FILTER,EMI/POWER | SFEY0007101 | | |
| L104 | INDUCTOR,CHIP | ELCH0010613 | | |
| L105 | INDUCTOR,CHIP | ELCH0010621 | | |
| L300 | FILTER,BEAD,CHIP | SFBH0000903 | | |
| L400 | FILTER,BEAD,CHIP | SFBH0000903 | | |
| L401 | FILTER,BEAD,CHIP | SFBH0000903 | | |
| L402 | FILTER,BEAD,CHIP | SFBH0000903 | | |
| Q200 | TR,FET,P-CHANNEL | EQFP0004201 | | |
| Q201 | TR,BJT,ARRAY | EQBA0000406 | | |
| Q300 | TR,BJT,NPN | EQBN0012701 | | |

11. Appendix

| Ref No | Part Name | Part Number | Color | Remark |
|--------|----------------|-------------|-------|--------|
| Q301 | TR,BJT,PNP | EQBP0004102 | | |
| Q302 | TR,BJT,NPN | EQBN0007601 | | |
| R100 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R101 | RES,CHIP,MAKER | ERHZ0000414 | | |
| R102 | RES,CHIP,MAKER | ERHZ0000204 | | |
| R103 | RES,CHIP | ERHY0003301 | | |
| R104 | RES,CHIP | ERHY0003301 | | |
| R105 | RES,CHIP,MAKER | ERHZ0000404 | | |
| R106 | RES,CHIP | ERHY0003501 | | |
| R107 | RES,CHIP,MAKER | ERHZ0000429 | | |
| R108 | RES,CHIP,MAKER | ERHZ0000522 | | |
| R109 | RES,CHIP,MAKER | ERHZ0000457 | | |
| R110 | RES,CHIP | ERHY0003501 | | |
| R111 | RES,CHIP,MAKER | ERHZ0000429 | | |
| R112 | RES,CHIP | ERHY0003301 | | |
| R113 | RES,CHIP | ERHY0003301 | | |
| R114 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R115 | RES,CHIP | ERHY0003301 | | |
| R117 | RES,CHIP,MAKER | ERHZ0000422 | | |
| R118 | RES,CHIP,MAKER | ERHZ0000405 | | |
| R119 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R203 | RES,CHIP,MAKER | ERHZ0000405 | | |
| R204 | RES,CHIP | ERHY0001102 | | |
| R205 | RES,CHIP,MAKER | ERHZ0000464 | | |
| R207 | RES,CHIP,MAKER | ERHZ0000529 | | |
| R208 | RES,CHIP,MAKER | ERHZ0000405 | | |
| R209 | RES,CHIP,MAKER | ERHZ0000404 | | |
| R210 | RES,CHIP,MAKER | ERHZ0000721 | | |
| R211 | RES,CHIP,MAKER | ERHZ0000488 | | |
| R212 | RES,CHIP,MAKER | ERHZ0000488 | | |
| R213 | RES,CHIP,MAKER | ERHZ0000527 | | |
| R214 | RES,CHIP,MAKER | ERHZ0000406 | | |
| R216 | RES,CHIP,MAKER | ERHZ0000404 | | |
| R217 | RES,CHIP | ERHY0000512 | | |
| R221 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R226 | RES,CHIP,MAKER | ERHZ0000320 | | |
| R228 | RES,CHIP,MAKER | ERHZ0000406 | | |
| R229 | VARISTOR | SEVY0004101 | | |
| R230 | VARISTOR | SEVY0003601 | | |
| R300 | RES,CHIP,MAKER | ERHZ0000443 | | |
| R301 | RES,CHIP,MAKER | ERHZ0000486 | | |

11. Appendix

| Ref No | Part Name | Part Number | Color | Remark |
|--------|----------------|-------------|-------|--------|
| R302 | RES,CHIP,MAKER | ERHZ0000488 | | |
| R312 | RES,CHIP,MAKER | ERHZ0000475 | | |
| R328 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R331 | VARISTOR | SEVY0004401 | | |
| R332 | VARISTOR | SEVY0004401 | | |
| R333 | VARISTOR | SEVY0004401 | | |
| R336 | RES,CHIP,MAKER | ERHZ0000466 | | |
| R338 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R342 | RES,CHIP,MAKER | ERHZ0000405 | | |
| R343 | RES,CHIP,MAKER | ERHZ0000404 | | |
| R344 | RES,CHIP,MAKER | ERHZ0000476 | | |
| R345 | RES,CHIP,MAKER | ERHZ0000454 | | |
| R346 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R349 | RES,CHIP,MAKER | ERHZ0000475 | | |
| R400 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R402 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R404 | RES,CHIP,MAKER | ERHZ0000405 | | |
| R410 | RES,CHIP,MAKER | ERHZ0000404 | | |
| R411 | RES,CHIP | ERHY0003301 | | |
| R412 | RES,CHIP | ERHY0003301 | | |
| R413 | RES,CHIP | ERHY0003301 | | |
| R414 | RES,CHIP | ERHY0003301 | | |
| R415 | RES,CHIP | ERHY0003301 | | |
| R416 | RES,CHIP | ERHY0003301 | | |
| R417 | RES,CHIP | ERHY0003301 | | |
| R418 | RES,CHIP | ERHY0003301 | | |
| R419 | RES,CHIP | ERHY0003301 | | |
| R421 | RES,CHIP,MAKER | ERHZ0000488 | | |
| R422 | RES,CHIP,MAKER | ERHZ0000488 | | |
| R424 | RES,CHIP | ERHY0003301 | | |
| R425 | RES,CHIP | ERHY0003301 | | |
| R426 | RES,CHIP | ERHY0003301 | | |
| R427 | RES,CHIP | ERHY0003301 | | |
| R428 | RES,CHIP | ERHY0003301 | | |
| R429 | RES,CHIP | ERHY0003301 | | |
| R430 | RES,CHIP | ERHY0003301 | | |
| R431 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R432 | RES,CHIP | ERHY0003301 | | |
| R433 | RES,CHIP | ERHY0003301 | | |
| R434 | RES,CHIP,MAKER | ERHZ0000404 | | |
| R435 | RES,CHIP,MAKER | ERHZ0000443 | | |

11. Appendix

| Ref No | Part Name | Part Number | Color | Remark |
|--------|-----------------------|-------------|--------|--------|
| R436 | RES,CHIP,MAKER | ERHZ0000443 | | |
| R437 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R438 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R439 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R440 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R441 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R442 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R443 | RES,CHIP,MAKER | ERHZ0002401 | | |
| R444 | RES,CHIP,MAKER | ERHZ0002401 | | |
| R448 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R451 | RES,CHIP,MAKER | ERHZ0000406 | | |
| R452 | RES,CHIP,MAKER | ERHZ0000406 | | |
| R453 | RES,CHIP,MAKER | ERHZ0000406 | | |
| R459 | RES,CHIP,MAKER | ERHZ0000466 | | |
| R460 | RES,CHIP,MAKER | ERHZ0000320 | | |
| R462 | RES,CHIP,MAKER | ERHZ0000456 | | |
| R463 | VARISTOR | SEVY0003601 | | |
| R464 | RES,CHIP,MAKER | ERHZ0000441 | | |
| R465 | VARISTOR | SEVY0003901 | | |
| R466 | VARISTOR | SEVY0003901 | | |
| R467 | VARISTOR | SEVY0003601 | | |
| R468 | VARISTOR | SEVY0003901 | | |
| R469 | VARISTOR | SEVY0003601 | | |
| R470 | VARISTOR | SEVY0003901 | | |
| U100 | CONN,RF SWITCH | ENWY0001801 | | |
| U101 | IC | EUSY0315401 | | |
| U102 | PAM | SMPY0008901 | | |
| U103 | IC | EUSY0223202 | | |
| U104 | FILTER,SEPERATOR | SFAY0005601 | | |
| U200 | IC | EUSY0250702 | | |
| U201 | IC | EUSY0280001 | | |
| U202 | BATTERY,CELL,LITHIUM | SBCL0001303 | | |
| U301 | IC | EUSY0193801 | | |
| U402 | IC | EUSY0306404 | | |
| U403 | TERMINAL,GROUND | MTCA0001801 | YELLOW | |
| X100 | VCTCXO | EXSK0005002 | | |
| X200 | X-TAL | EXXY0004602 | | |
| SAFD00 | PCB ASSY,MAIN,SMT TOP | SAFD0083701 | | |
| C303 | CAP,CERAMIC,CHIP | ECCH0000155 | | |
| C304 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C306 | CAP,CHIP,MAKER | ECZH0000813 | | |

11. Appendix

| Ref No | Part Name | Part Number | Color | Remark |
|--------|-----------------------|-------------|-------|--------|
| C307 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C308 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C309 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C310 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C311 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C312 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C313 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C314 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C317 | CAP,TANTAL,CHIP,MAKER | ECTZ0005201 | | |
| C318 | CAP,TANTAL,CHIP,MAKER | ECTZ0005201 | | |
| C319 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C321 | CAP,CHIP,MAKER | ECZH0000813 | | |
| C322 | CAP,CHIP,MAKER | ECZH0001215 | | |
| C324 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C325 | CAP,CERAMIC,CHIP | ECCH0002001 | | |
| C400 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C401 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| C457 | CAP,CERAMIC,CHIP | ECCH0000120 | | |
| LED300 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED301 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED302 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED303 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED304 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED305 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED306 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED307 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED308 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED309 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED310 | DIODE,LED,CHIP | EDLH0011601 | | |
| LED311 | DIODE,LED,CHIP | EDLH0011601 | | |
| Q303 | TR,BJT,PNP | EQBP0006701 | | |
| R303 | RES,CHIP | ERHY0003501 | | |
| R304 | RES,CHIP | ERHY0003501 | | |
| R305 | RES,CHIP | ERHY0003501 | | |
| R306 | RES,CHIP | ERHY0003501 | | |
| R307 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R308 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R309 | RES,CHIP,MAKER | ERHZ0000404 | | |
| R310 | RES,CHIP | ERHY0003501 | | |
| R311 | RES,CHIP | ERHY0003501 | | |

11. Appendix

| Ref No | Part Name | Part Number | Color | Remark |
|--------|-------------------|-------------|-------|--------|
| R313 | RES,CHIP | ERHY0003501 | | |
| R314 | RES,CHIP | ERHY0003501 | | |
| R315 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R316 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R317 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R318 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R319 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R320 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R321 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R322 | RES,CHIP | ERHY0003501 | | |
| R323 | RES,CHIP | ERHY0003501 | | |
| R324 | RES,CHIP | ERHY0003501 | | |
| R325 | RES,CHIP | ERHY0003501 | | |
| R329 | RES,CHIP,MAKER | ERHZ0000401 | | |
| R330 | RES,CHIP,MAKER | ERHZ0000505 | | |
| R334 | RES,CHIP,MAKER | ERHZ0000404 | | |
| R335 | RES,CHIP,MAKER | ERHZ0000443 | | |
| R339 | RES,CHIP,MAKER | ERHZ0000484 | | |
| R340 | RES,CHIP,MAKER | ERHZ0000438 | | |
| R348 | RES,CHIP,MAKER | ERHZ0000406 | | |
| R454 | RES,CHIP,MAKER | ERHZ0000406 | | |
| R455 | RES,CHIP,MAKER | ERHZ0000406 | | |
| R456 | RES,CHIP,MAKER | ERHZ0000406 | | |
| SPFY00 | PCB,MAIN | SPFY0139901 | | |
| U300 | IC | EUSY0194002 | | |
| U302 | IC | EUSY0315001 | | |
| VR400 | VARISTOR | SEVY0004101 | | |
| VR401 | VARISTOR | SEVY0004101 | | |
| SPFY00 | PCB,MAIN | SPFY0139901 | | |
| WSYY00 | SOFTWARE | WSYY0462501 | | |
| SNGF00 | ANTENNA,GSM,FIXED | SNGF0020201 | | 44 |